



# Basic Tracking Distributions at 7 TeV

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for the Tracking POG

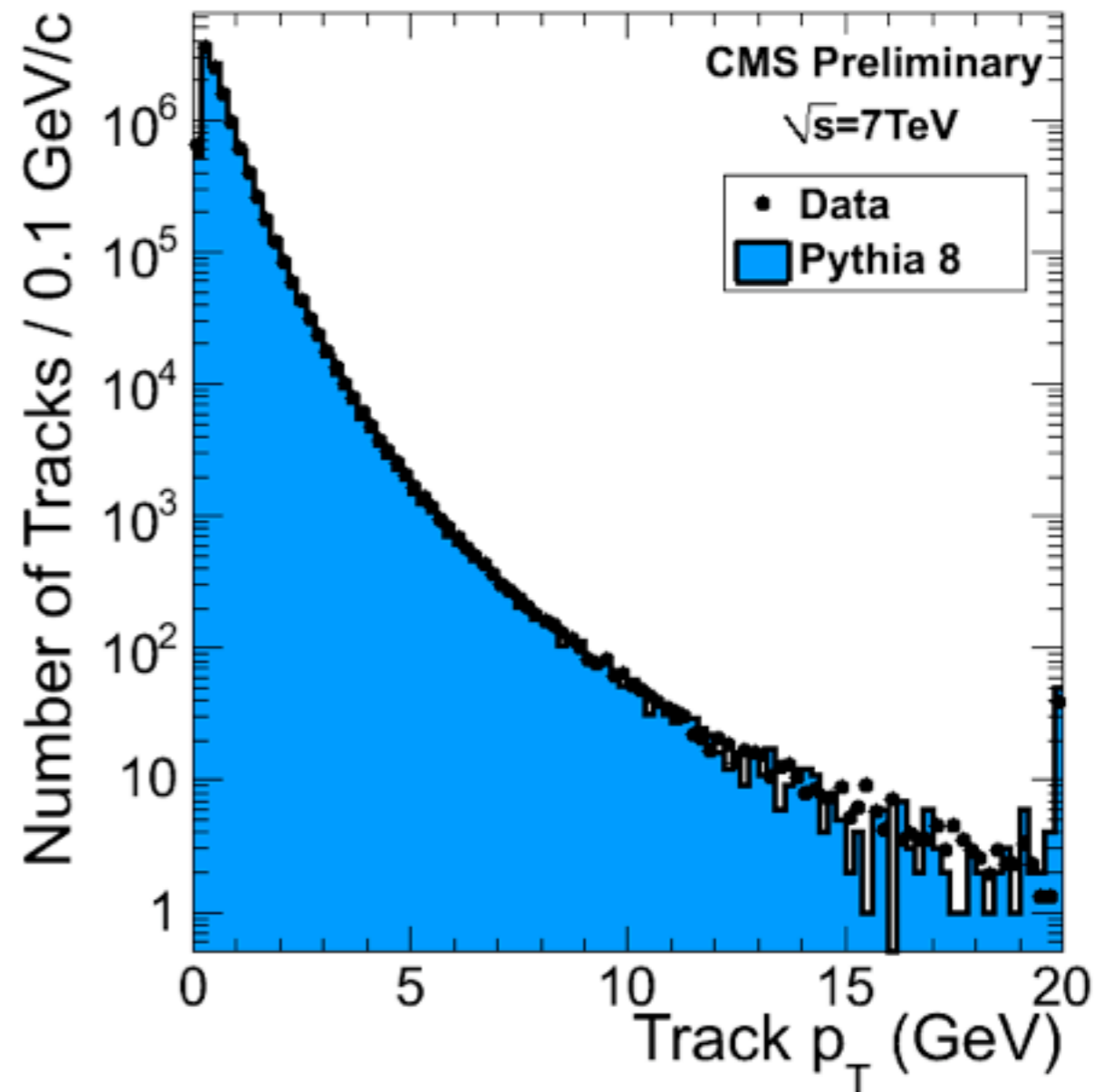
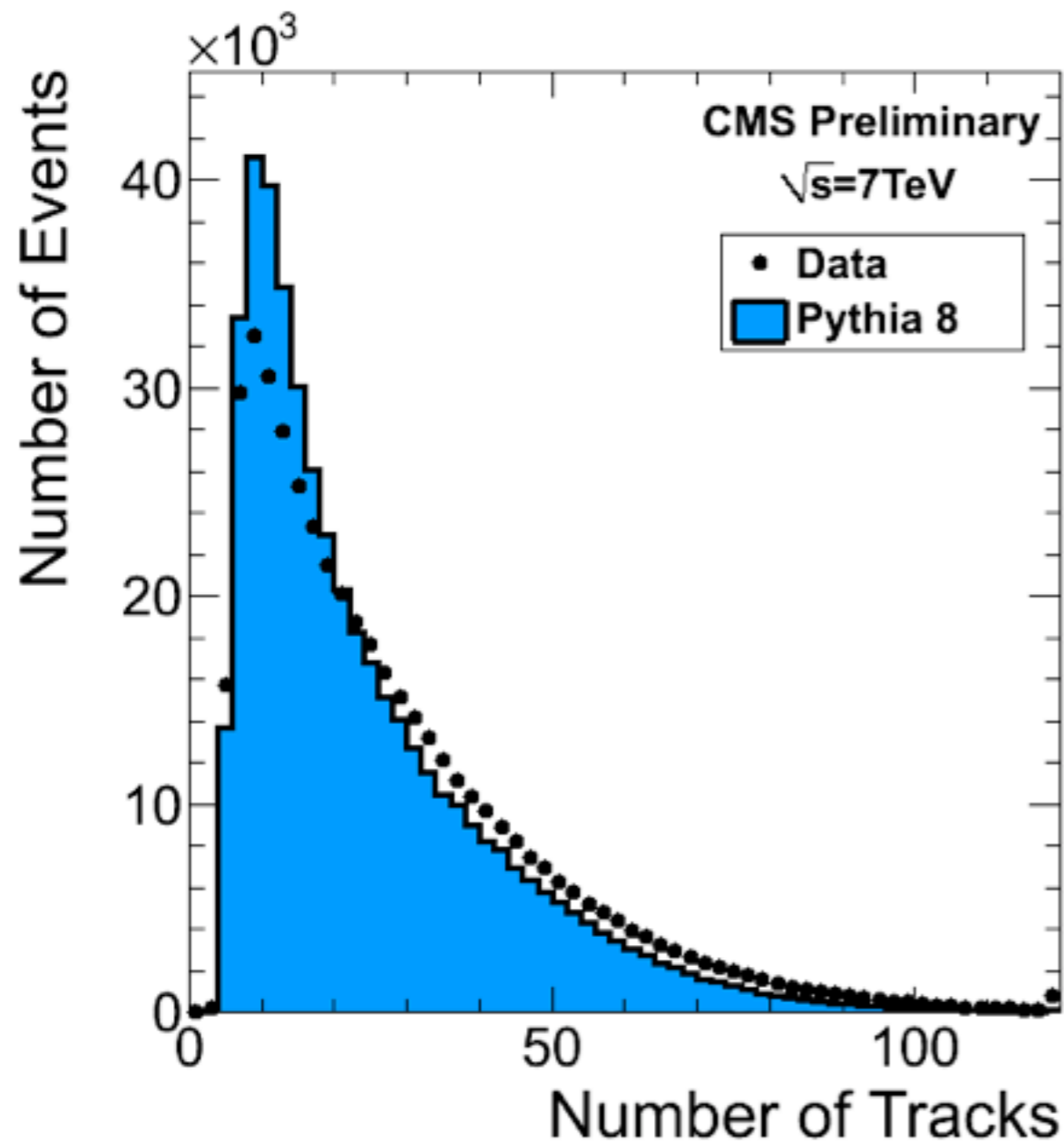
Plots in this talk are available at <http://home.fnal.gov/~ygao/CMS/Tracking/TrackPAS7TeV/>

Details on the MC tuning: <https://twiki.cern.ch/twiki/bin/view/CMS/TrackingPOGMCTuning>

# Compare the Data to Pythia MC

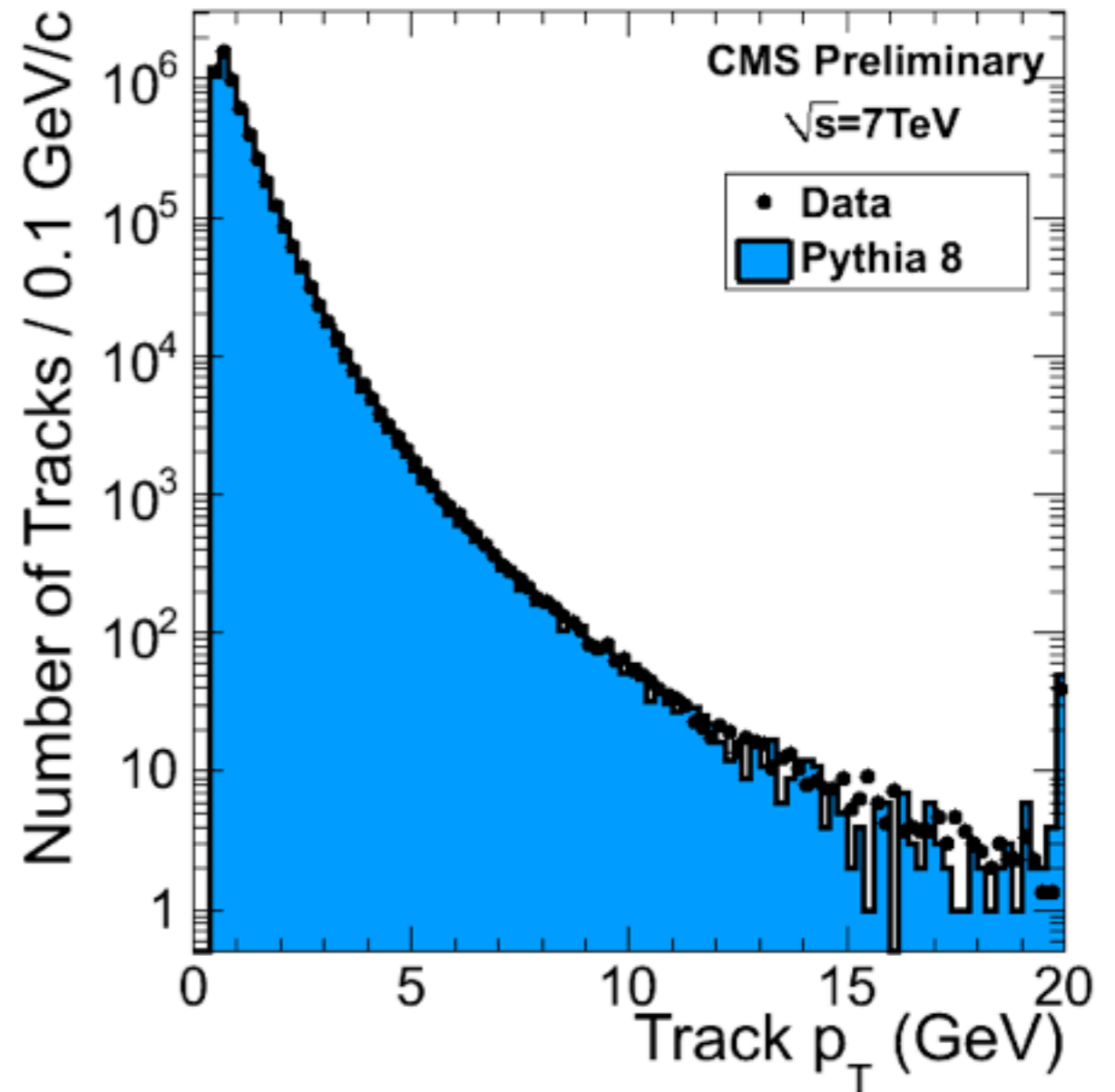
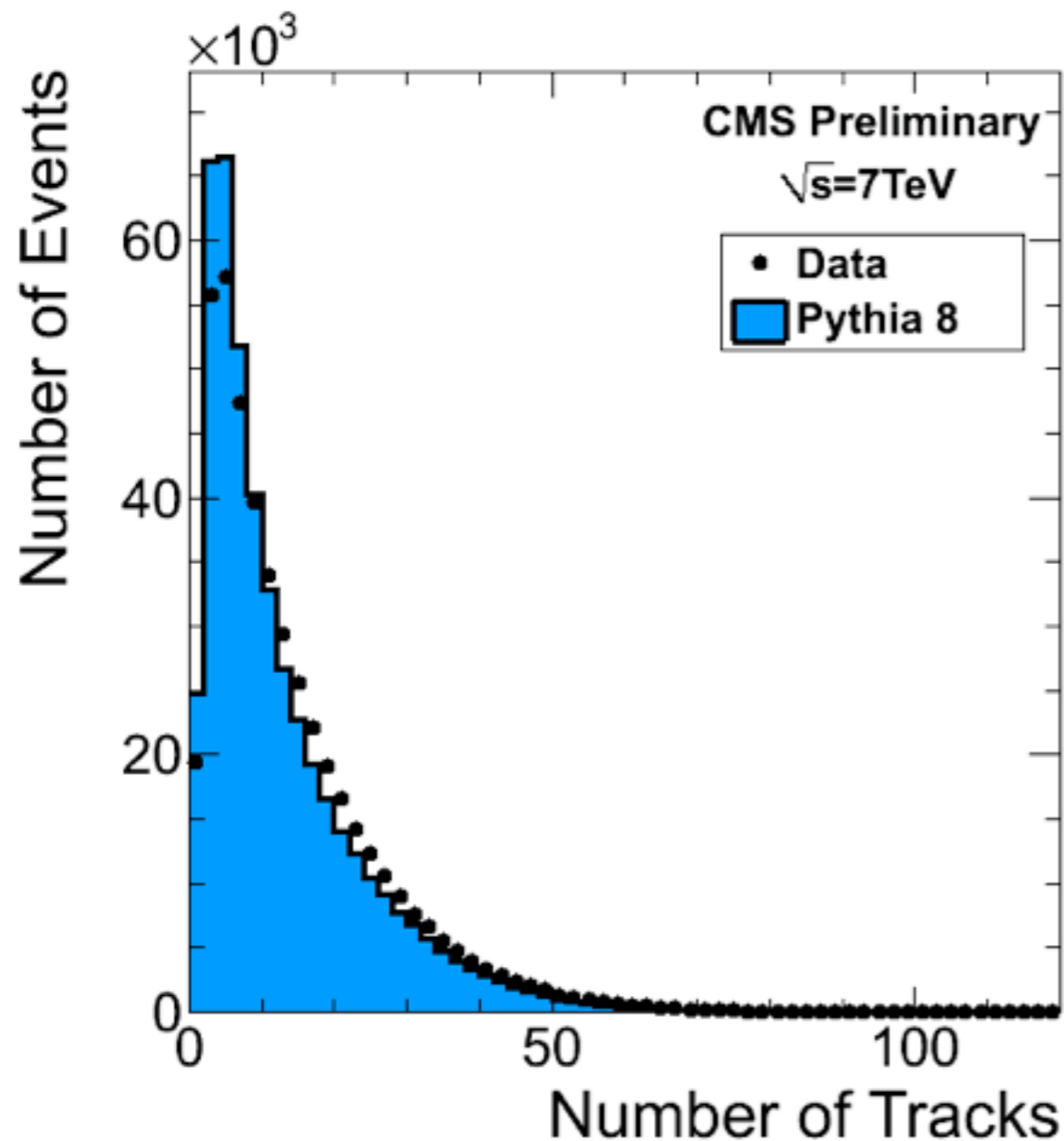
- Dataset reconstructed in 358p3
  - Run 132601: /MinimumBias/Commissioning10-May6thPDSkim\_GOODCOLL-v1
  - **Switch to Pythia 8 MC:** /MinBias\_7TeV-pythia8/Spring10-START3X\_V26B-v1/
  - Data/Pythia D6T results are in the backup slides
- Event selections: GOODCOLL skim
  - AND between goodvertex/noscraping/L1 trigger bits in GOODCOLL
- Track selections
  - HighPurity && ptErr/pt<5% && |dz significance|<10
  - optional pT>0.5 GeV
- Notes on the plots in the next slides
  - All track distributions except the track multiplicity are normalized by nTracks
  - Track distributions normalized by nEvents are in backup slides
  - The first(last) bin of the histograms include the underflow(overflow) bins

# Data/Pythia 8 Track Distributions ( $p_T > 0$ )



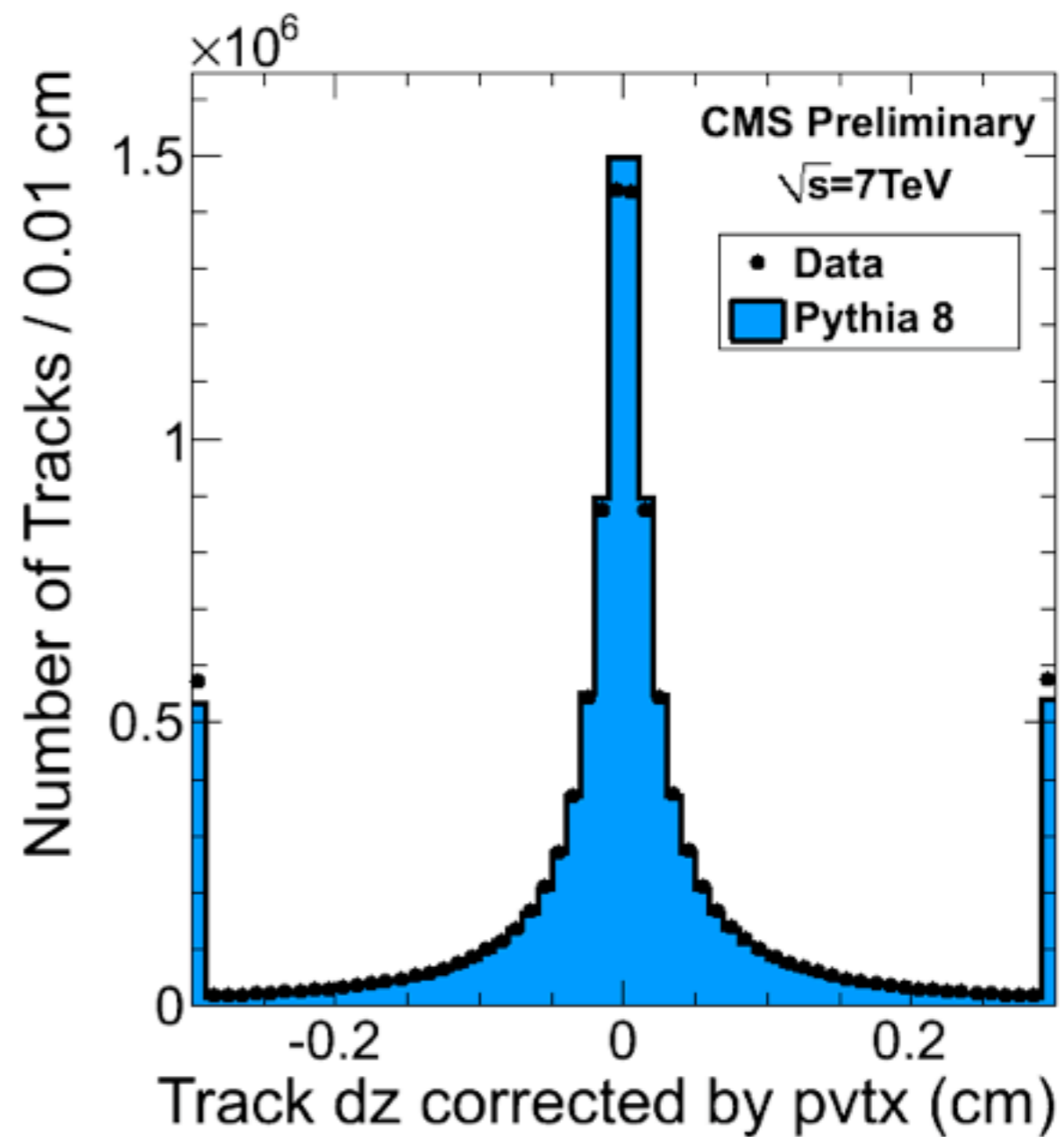
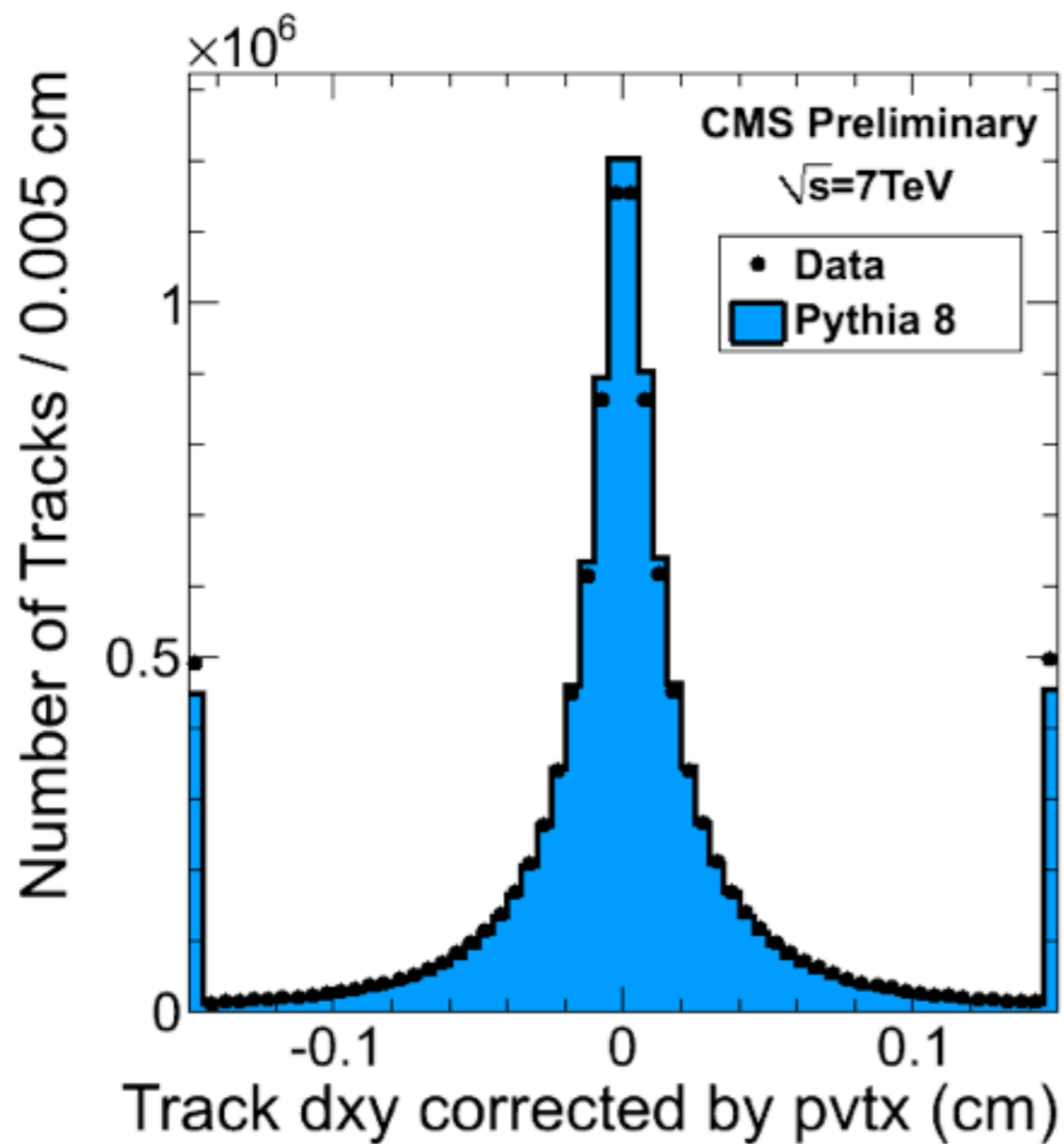
- The excess in the data are mainly in the low  $p_T$  region
- The nTrack plot in log scale and data/MC $\sim p_T$  plot is in backup slides 12/13

# Data/Pythia 8 Tracking Distributions ( $p_T > 0.5 \text{ GeV}$ )

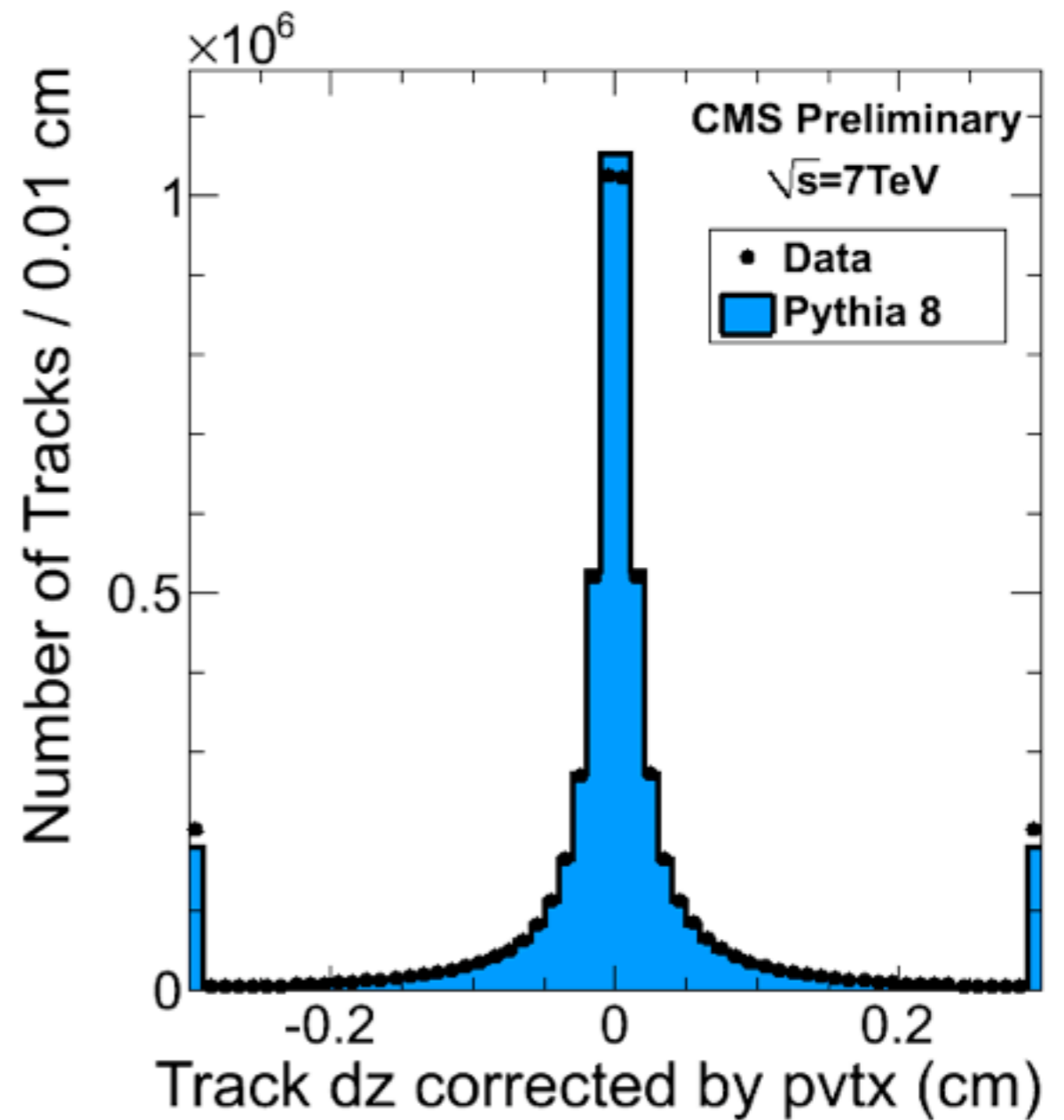
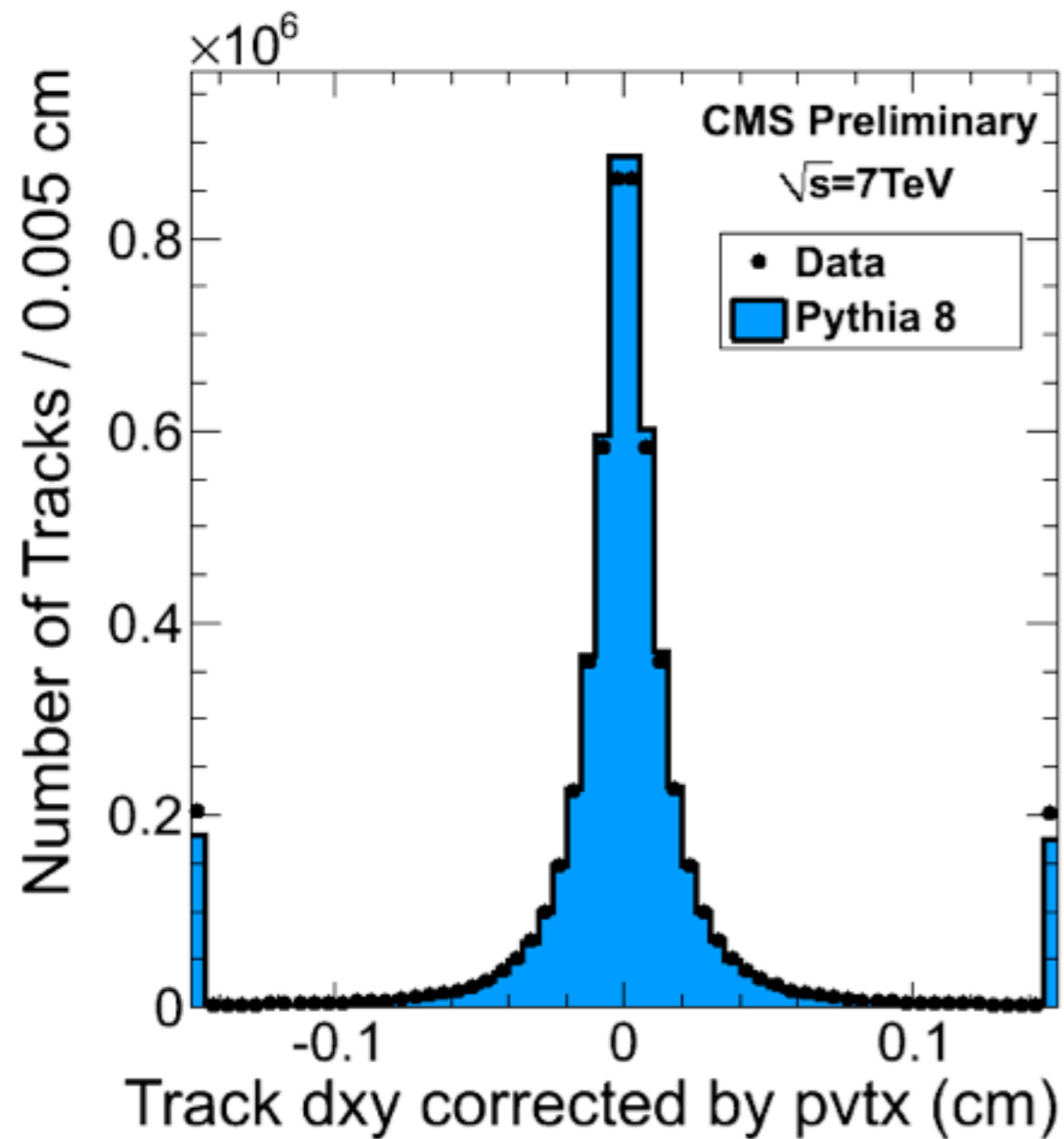


- The track multiplicity agrees better between data/MC
- There is still an overall excess of tracks in the data.
- The nTrack plot in log scale and data/MC $\sim p_T$  plot is in backup slide 12

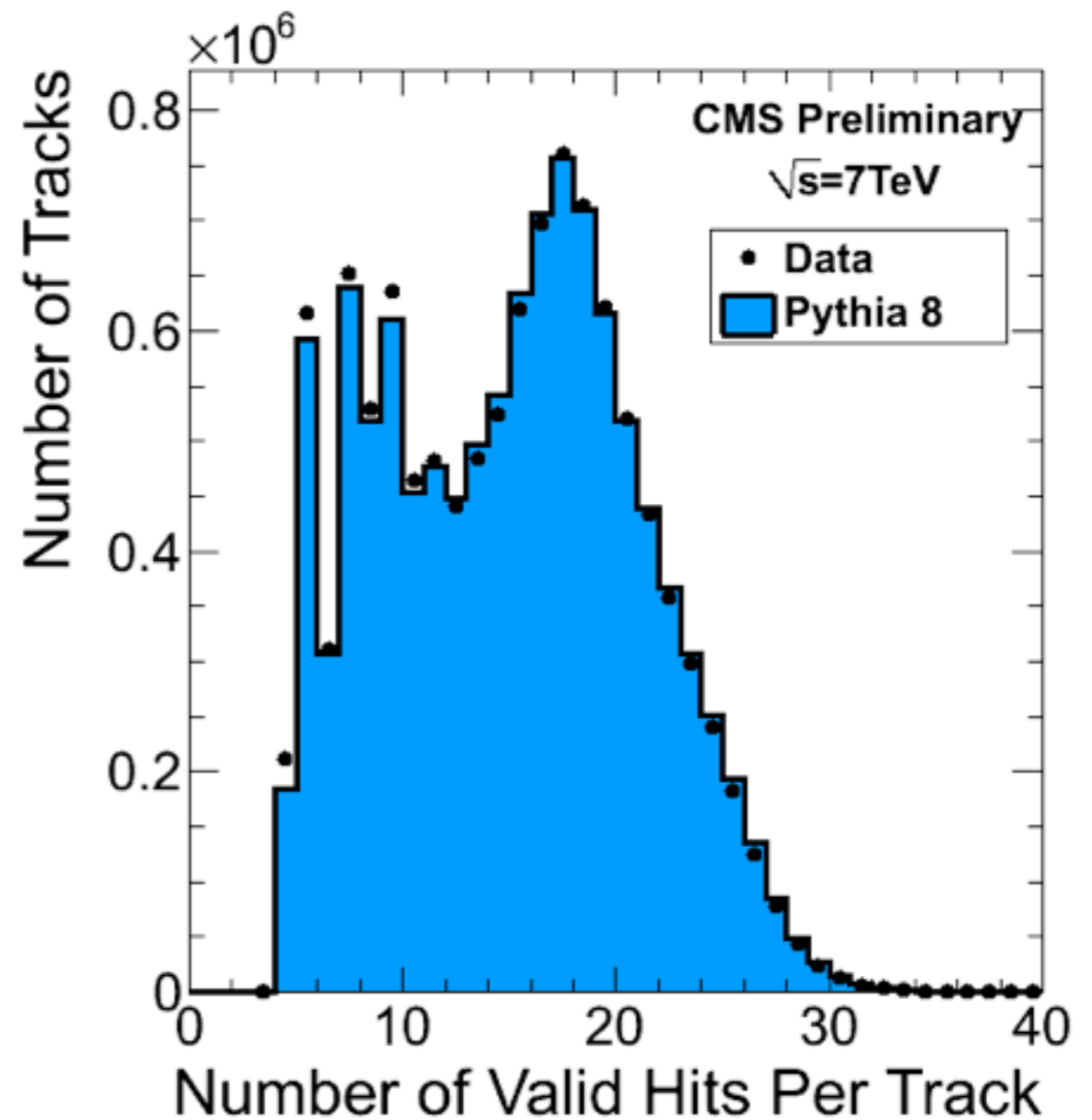
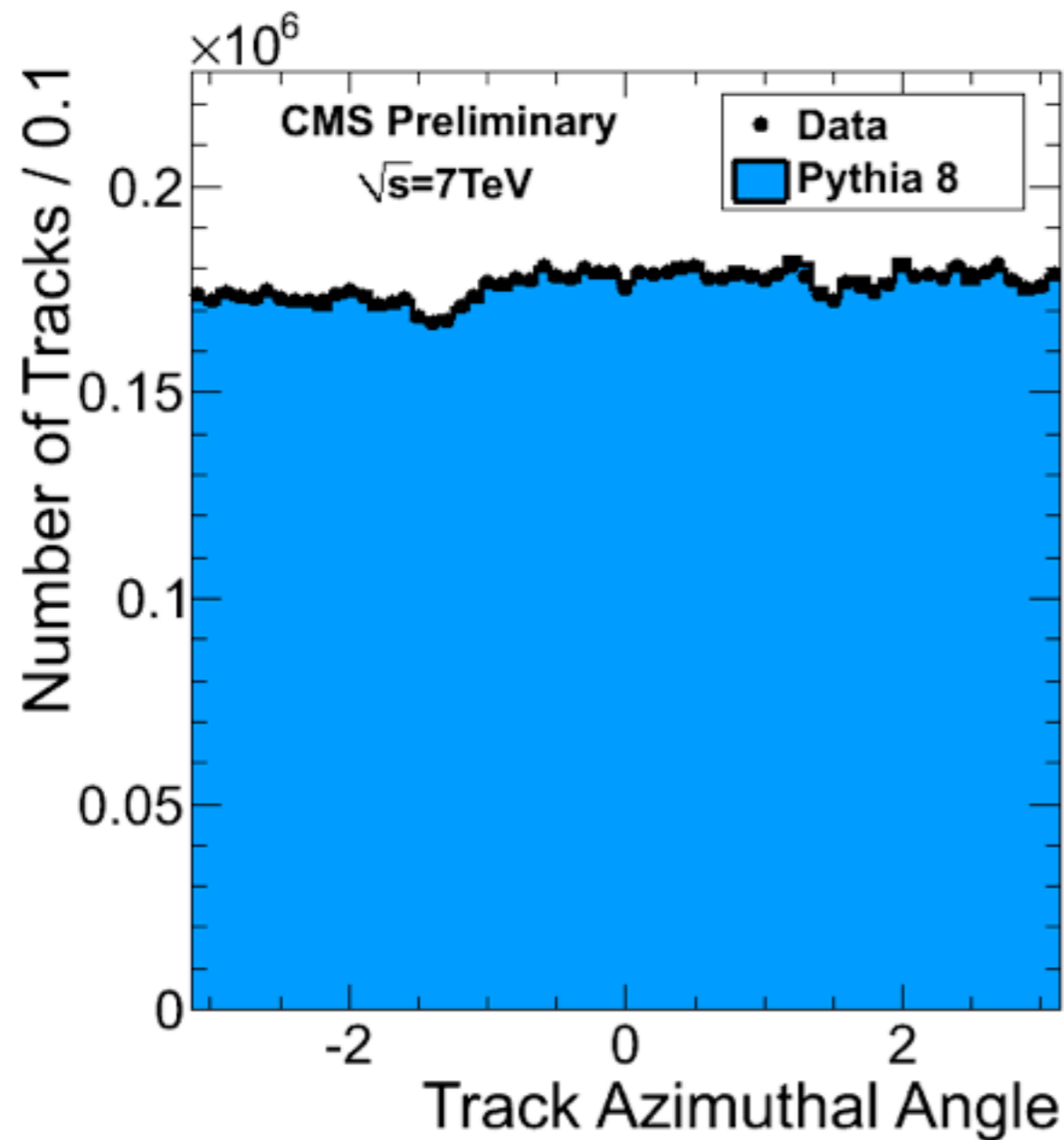
# Data/Pythia 8 Track Distributions ( $p_T > 0$ )



# Data/Pythia 8 Track Distributions ( $p_T > 0.5 \text{ GeV}$ )

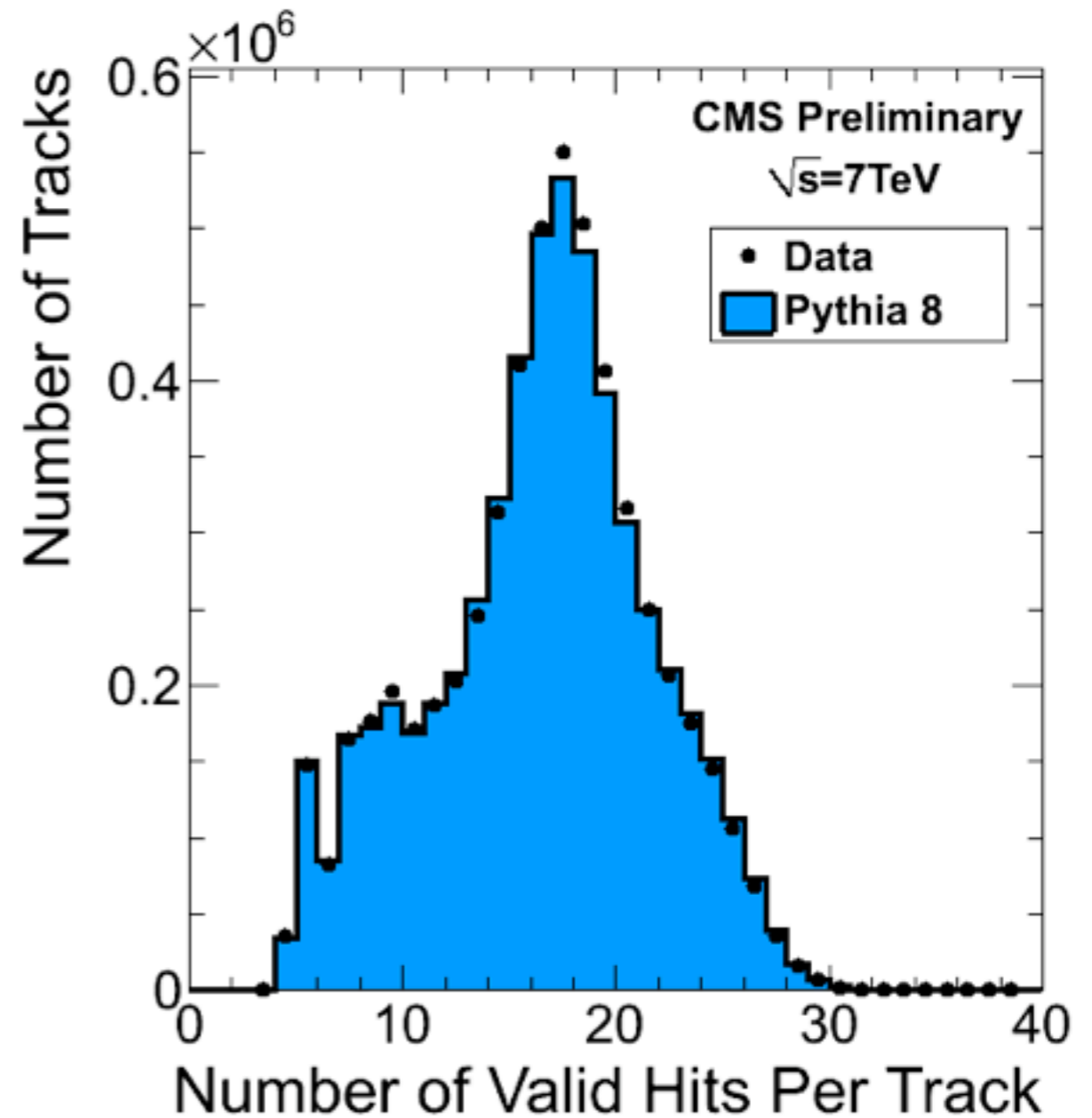
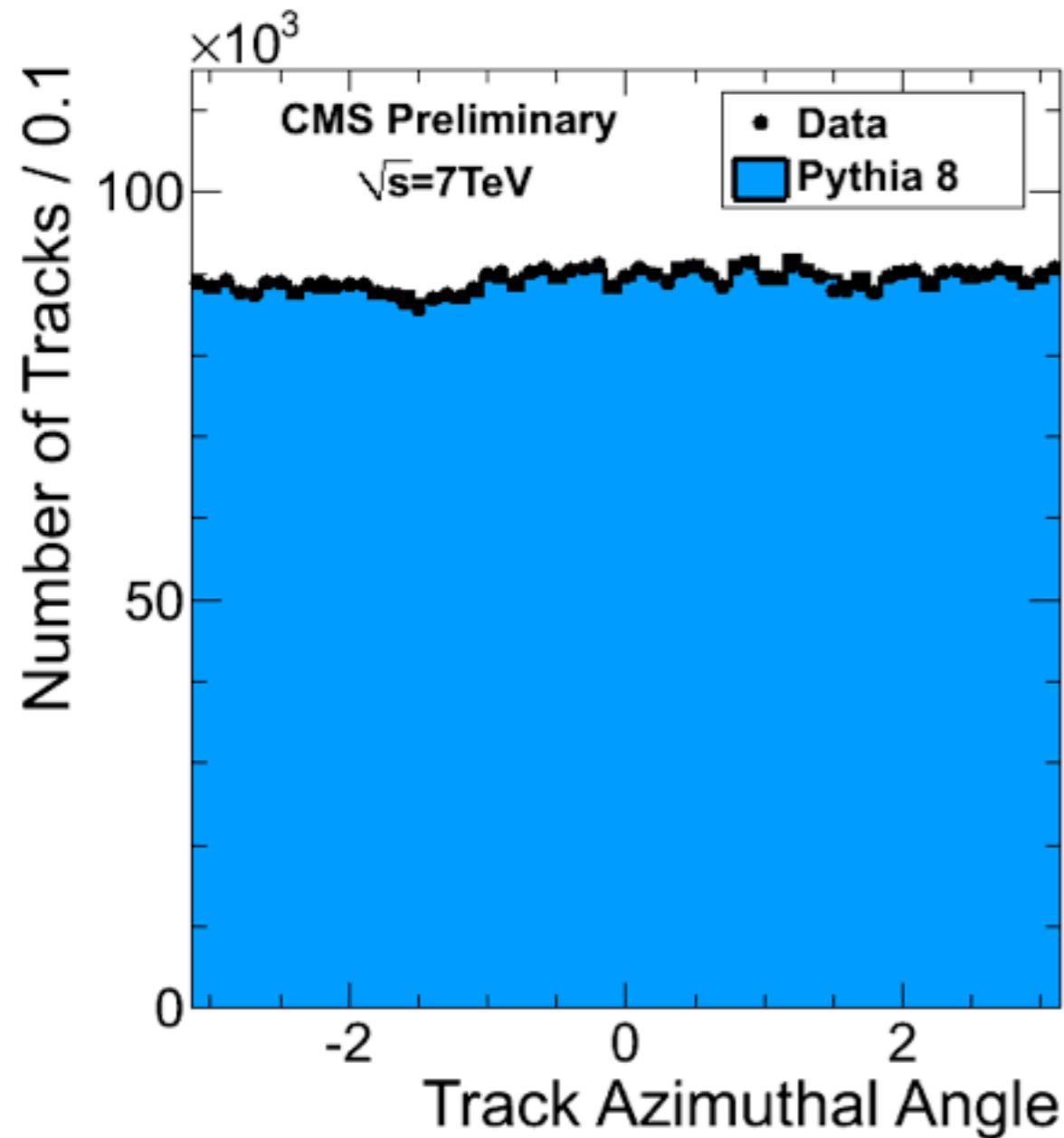


# Data/Pythia 8 Track Distributions ( $p_T > 0$ )



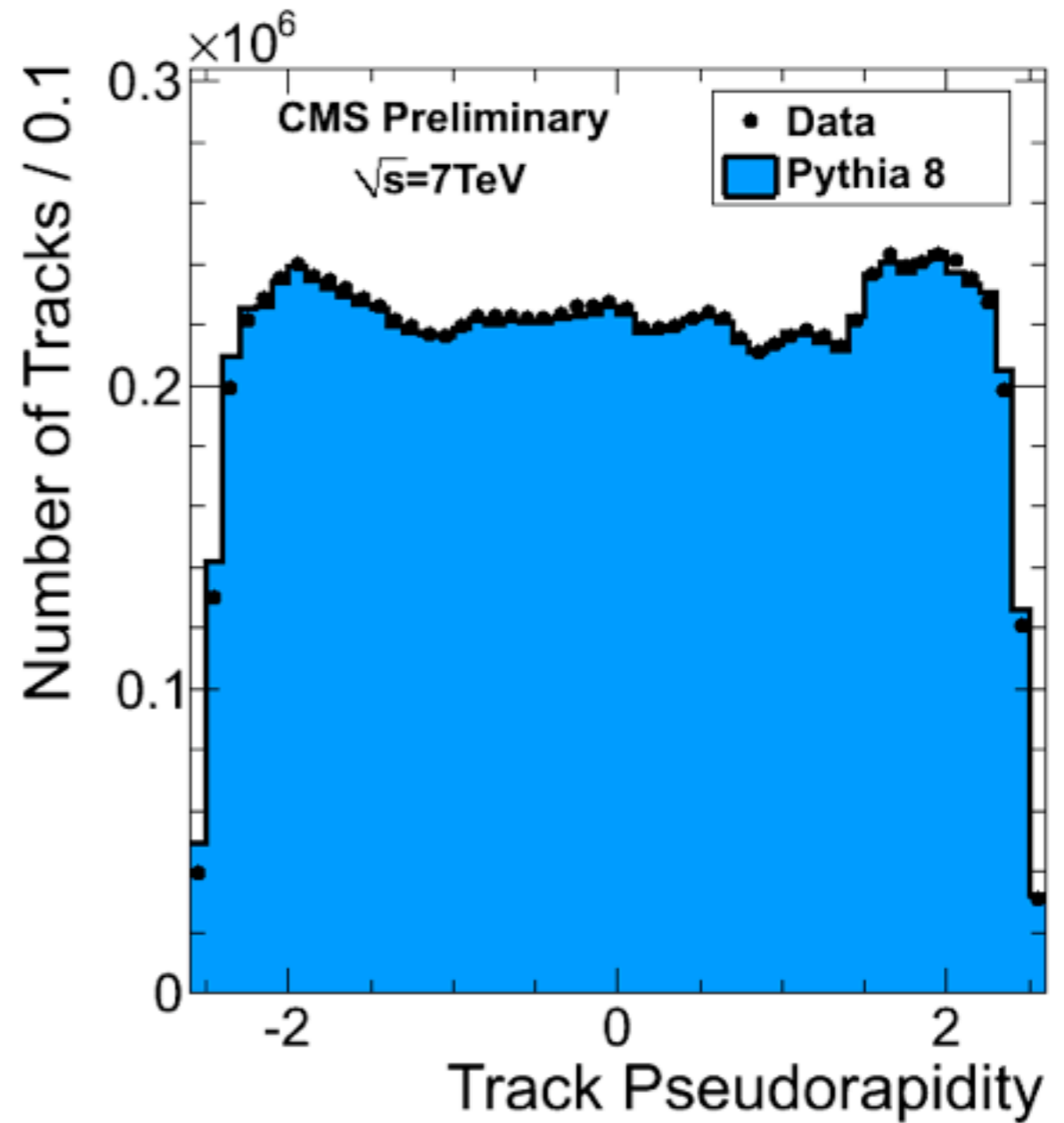
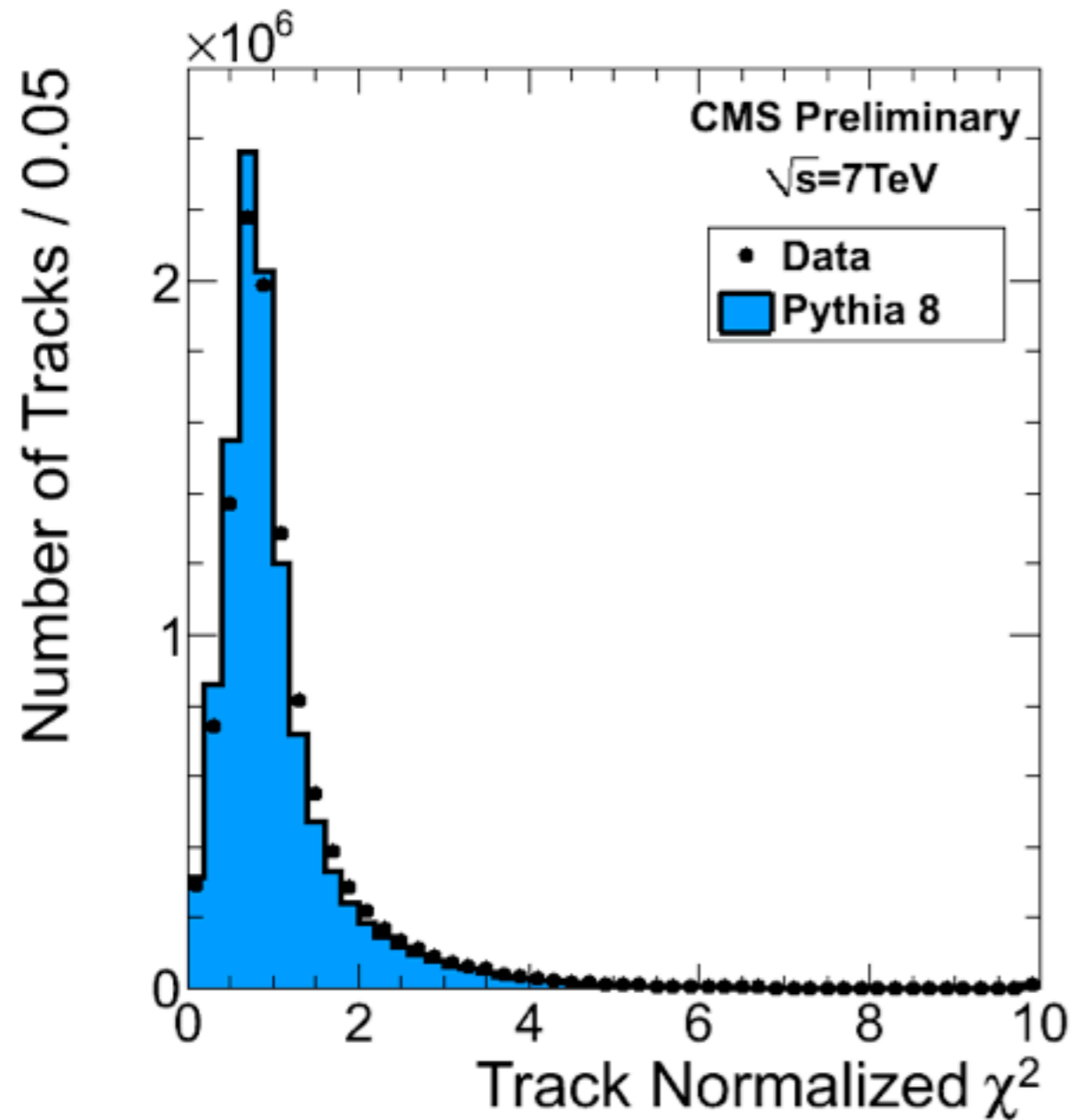
- The disagreement in the low nHit bins are mainly due to low  $p_T$  tracks
- The dip at  $\phi \sim -1.5$  is due to the inactive material in the tracker. It affects mainly for the low  $p_T$  tracks

# Data/Pythia 8 Track Distributions ( $p_T > 0.5 \text{ GeV}$ )

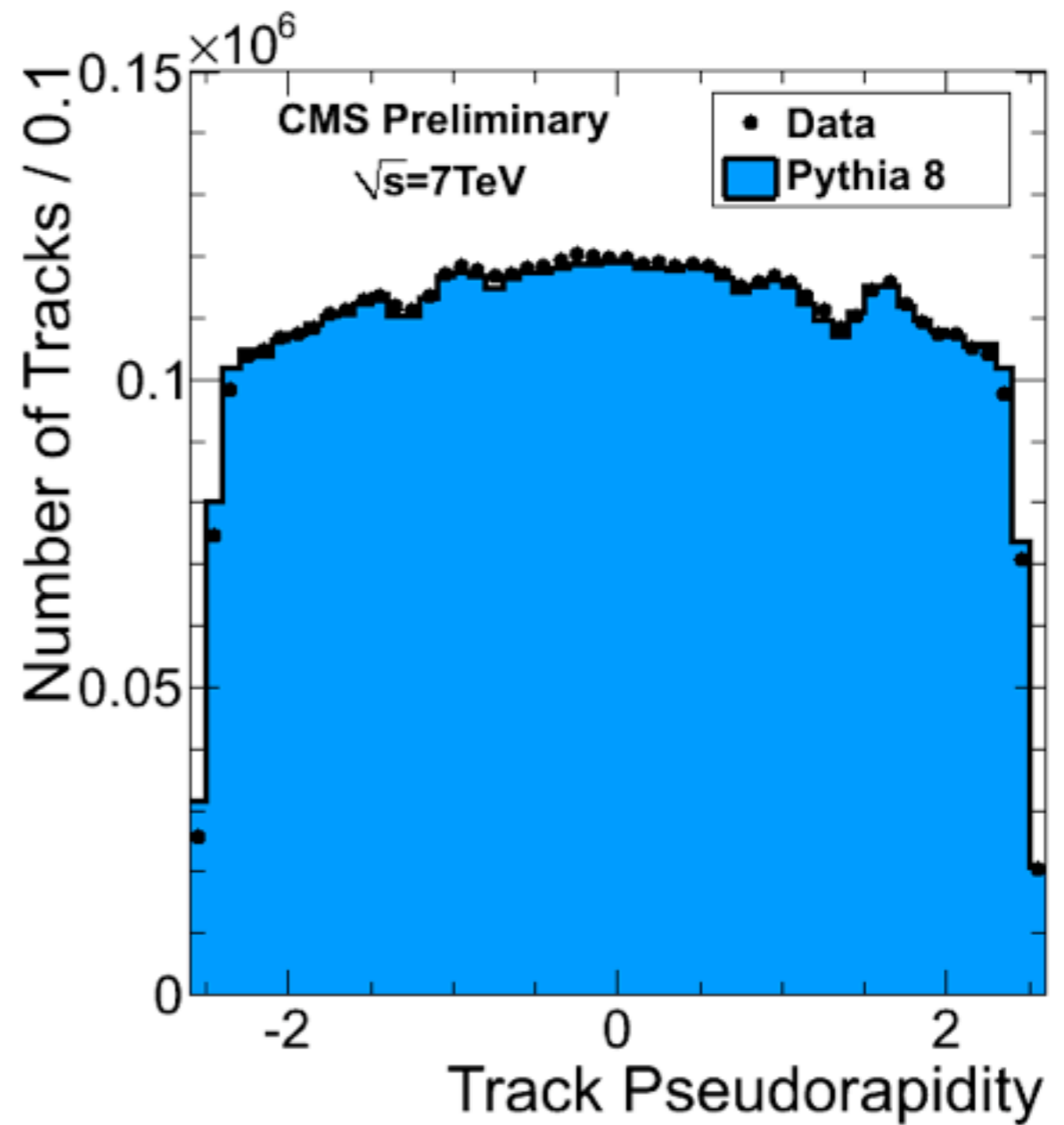
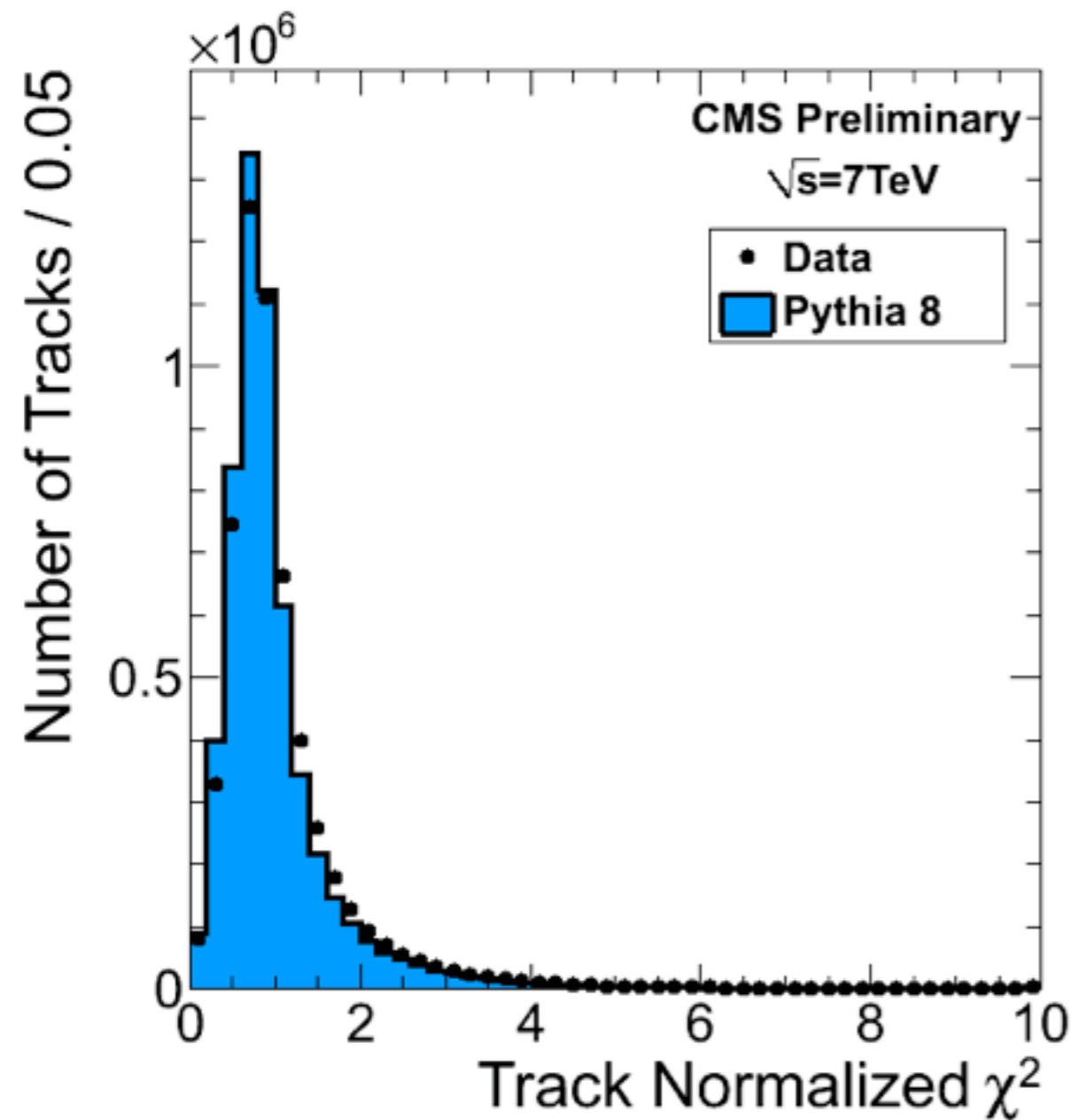


- The dip at the  $\sim -1.5$  gets much smaller

# Data/Pythia 8 Track Distributions ( $p_T > 0$ )

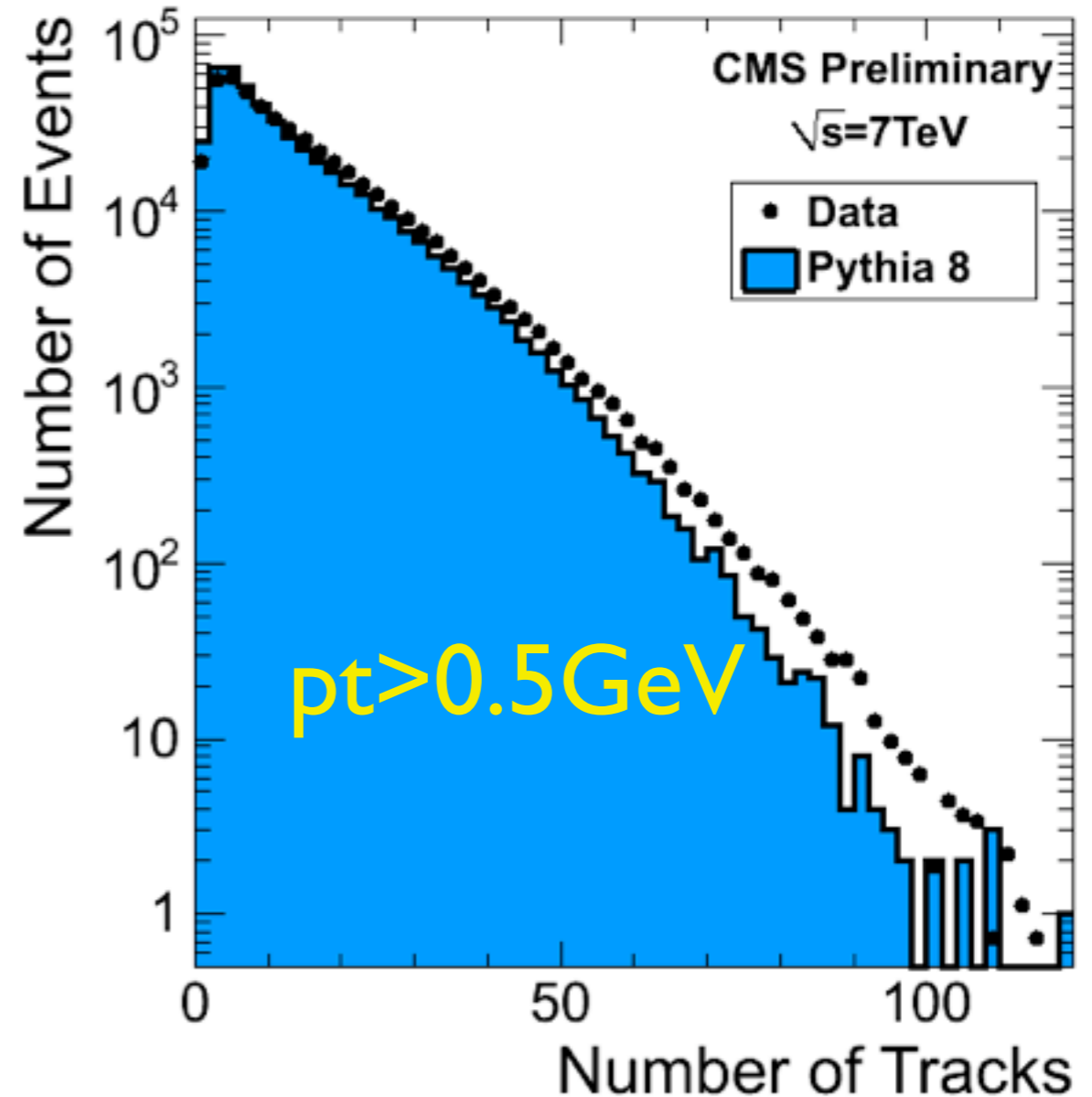
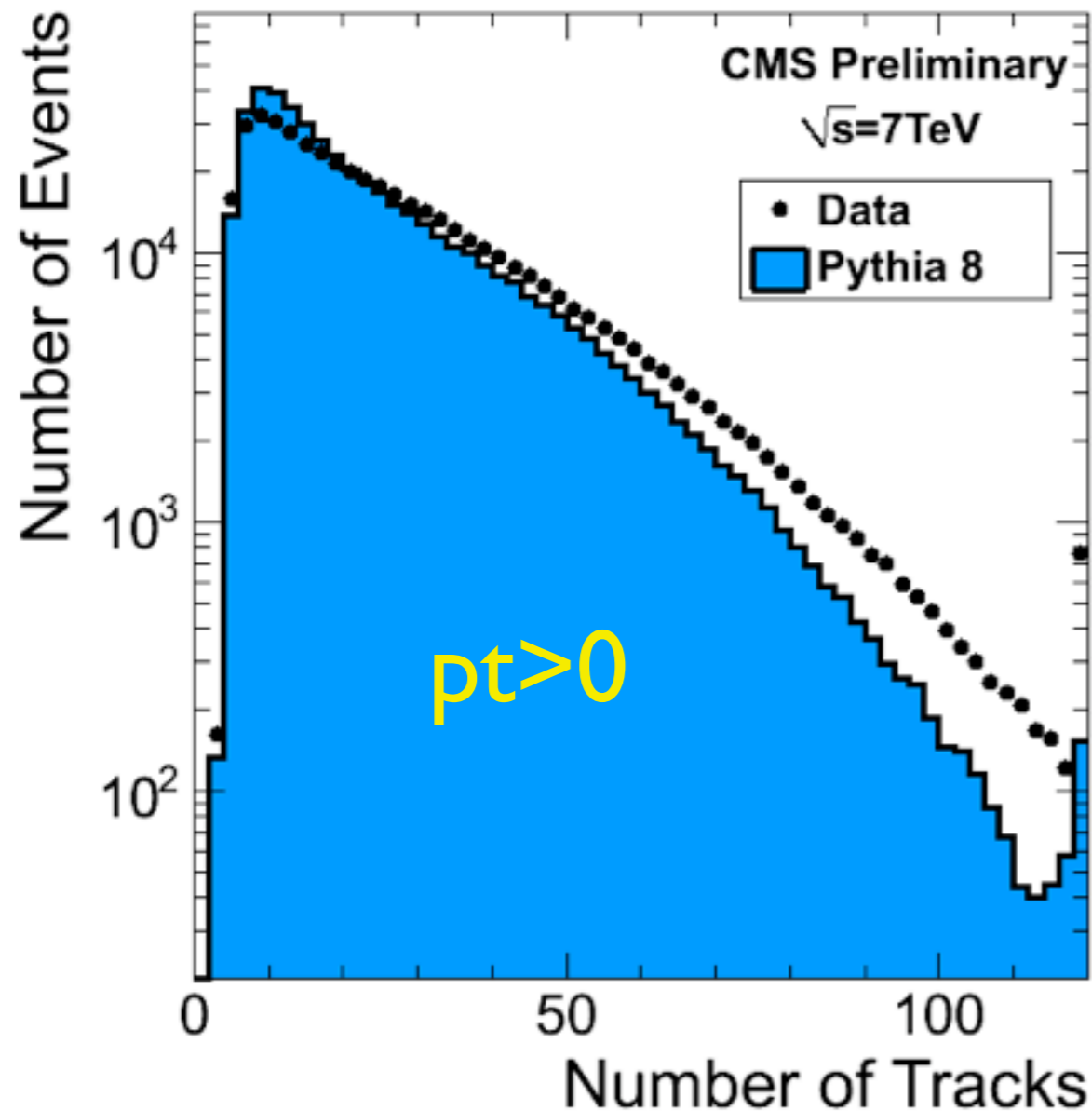


# Data/Pythia 8 Track Distributions ( $p_T > 0.5 \text{ GeV}$ )



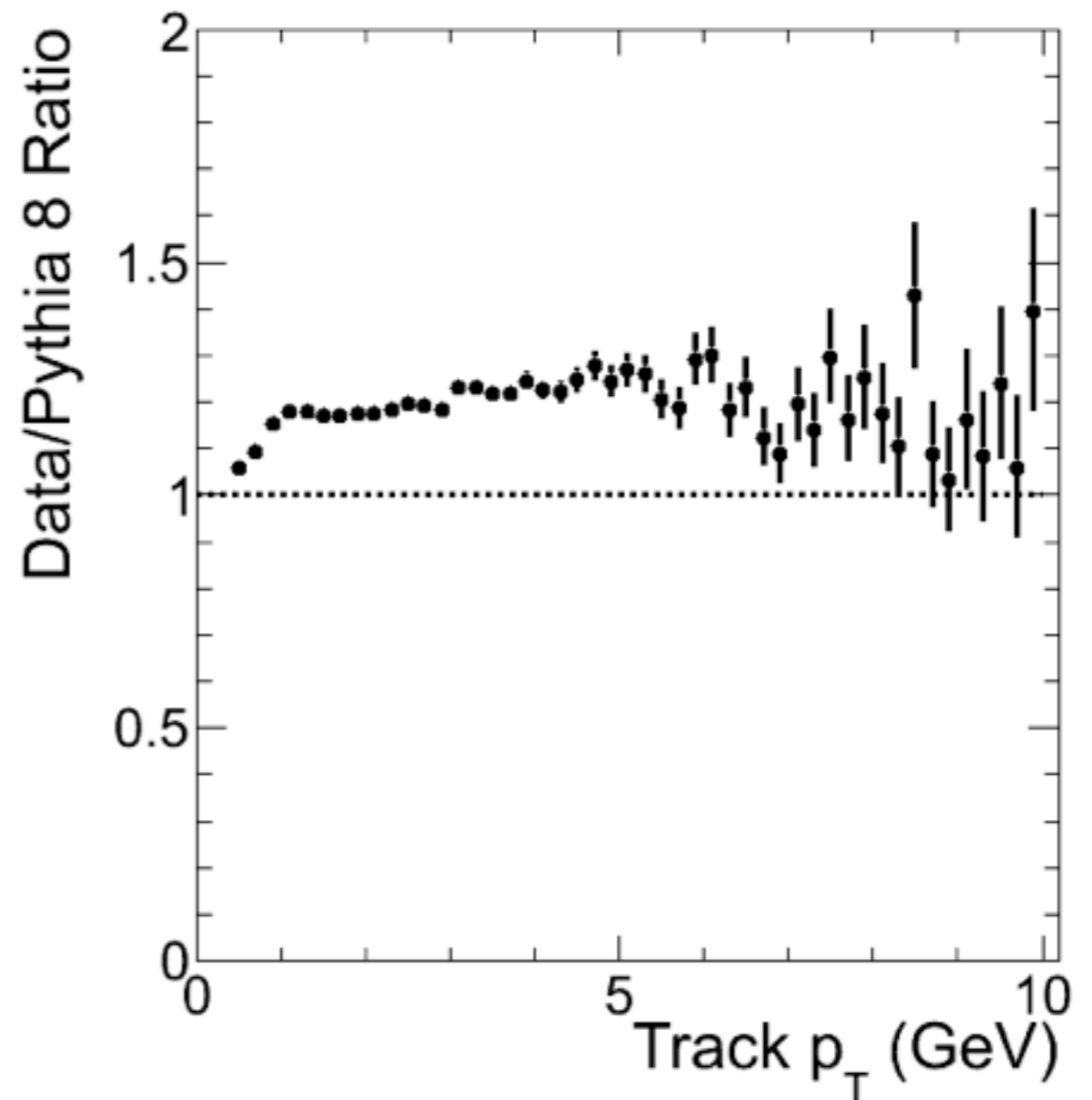
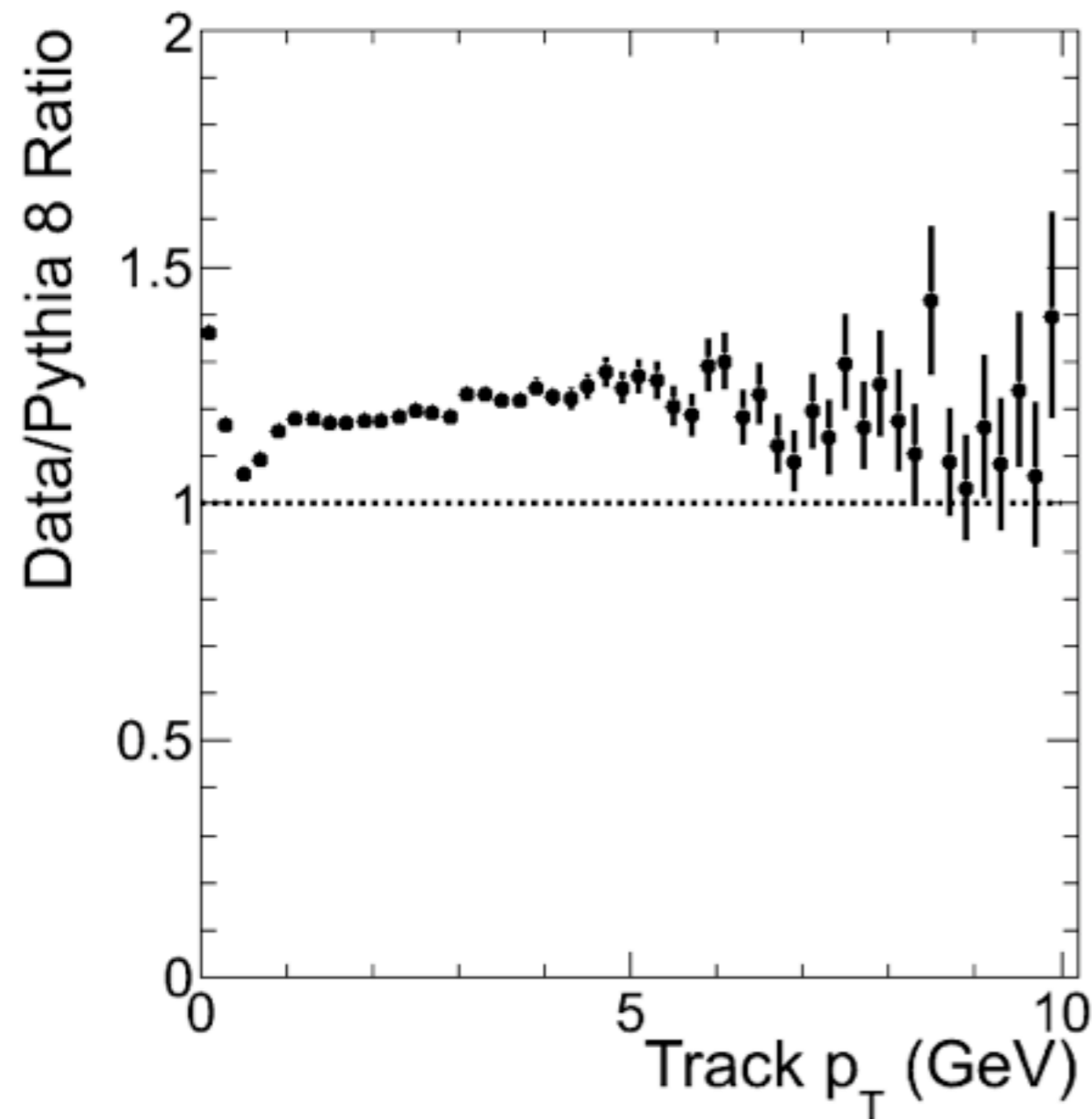
# Backup Slides

# Data/Pythia 8 nTracks in Log Scale



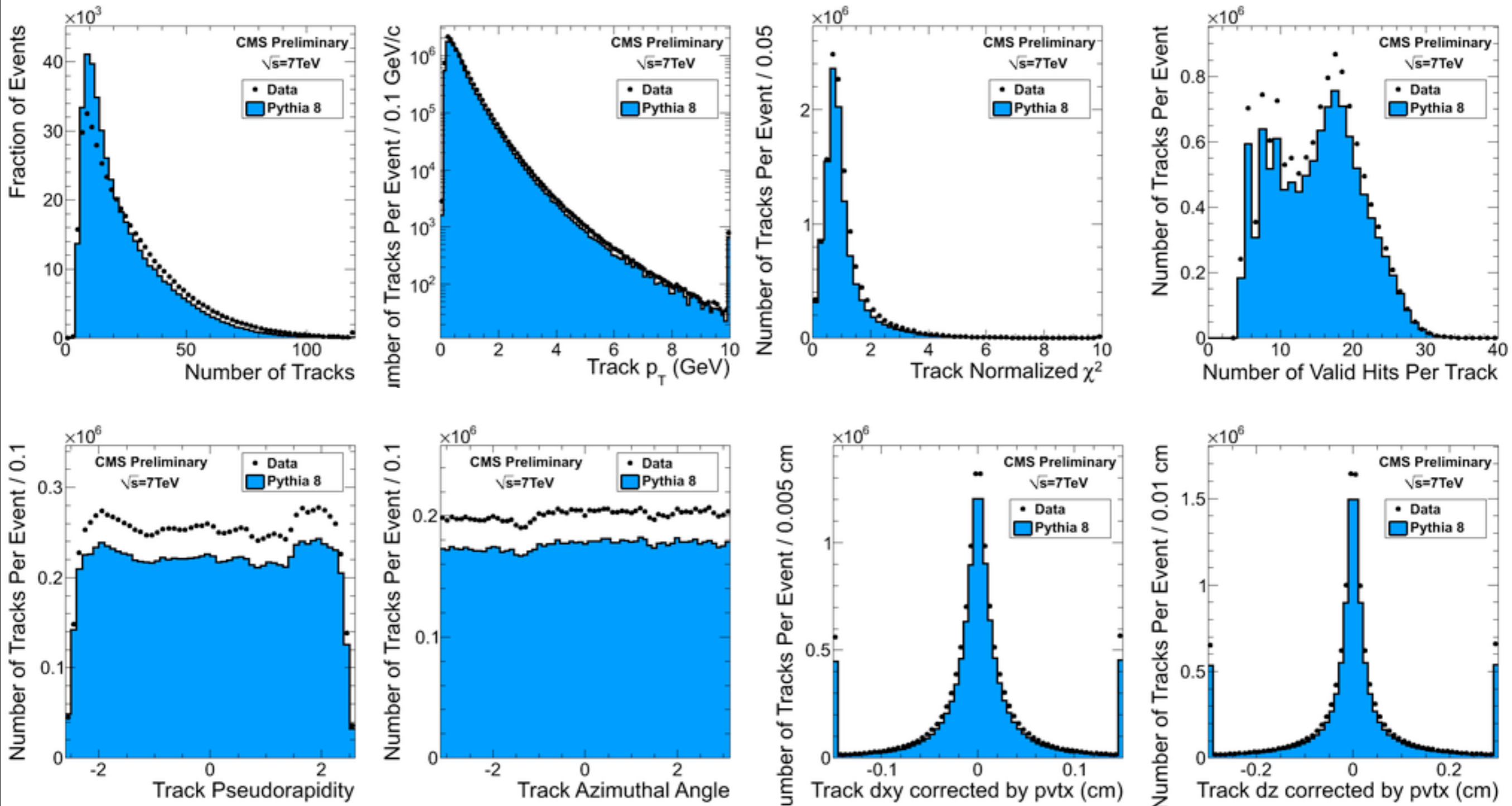
- The excess in the data are mainly in the low  $p_T$  region

# Data/Pythia 8 Data/MC nTrack Ratio vs p<sub>T</sub>



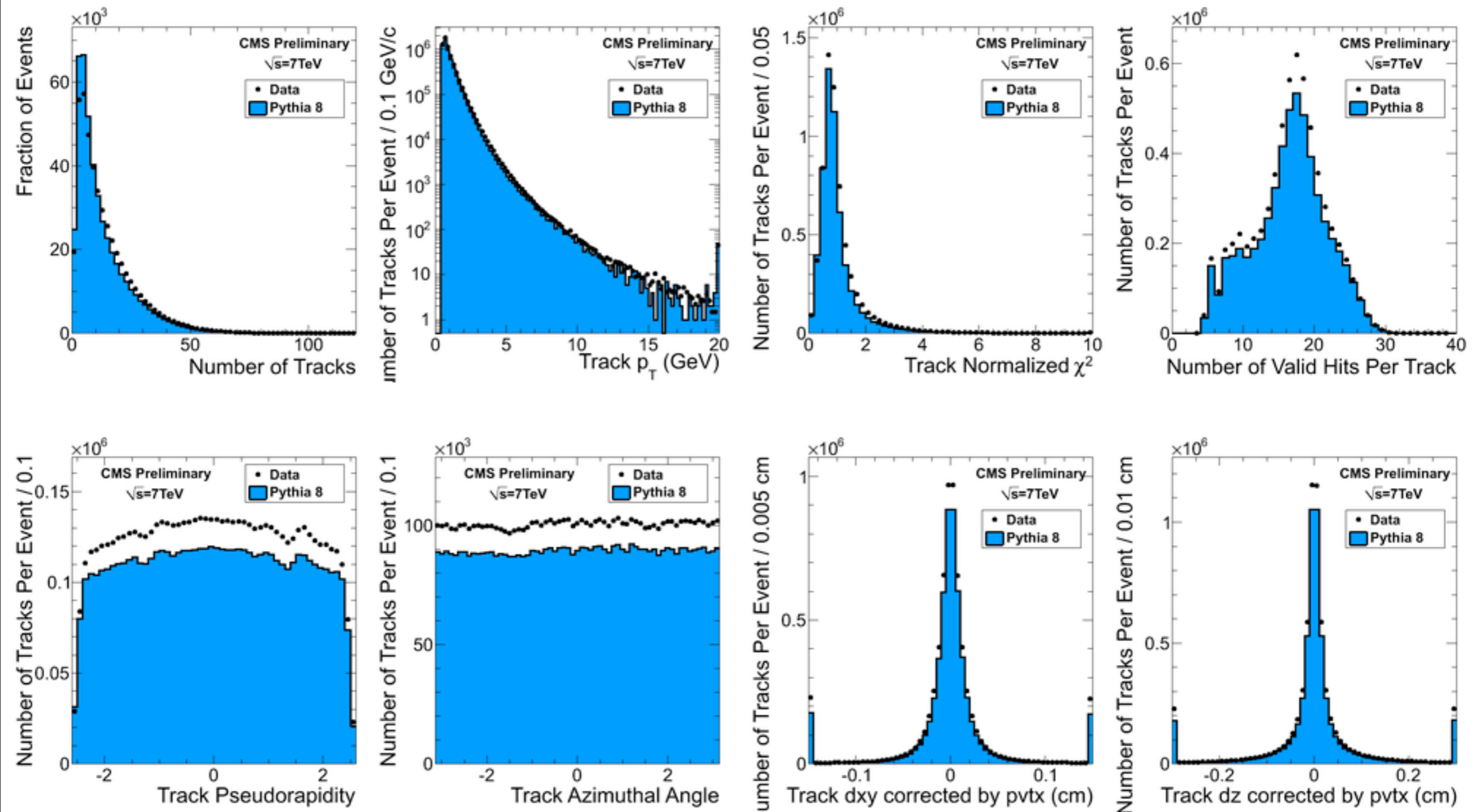
- The data/MC ratio is based on the individual p<sub>T</sub> distributions normalized by number of events

# Data/Pythia 8 Track Distributions ( $p_T > 0$ )



- The distributions are normalized by number of Events

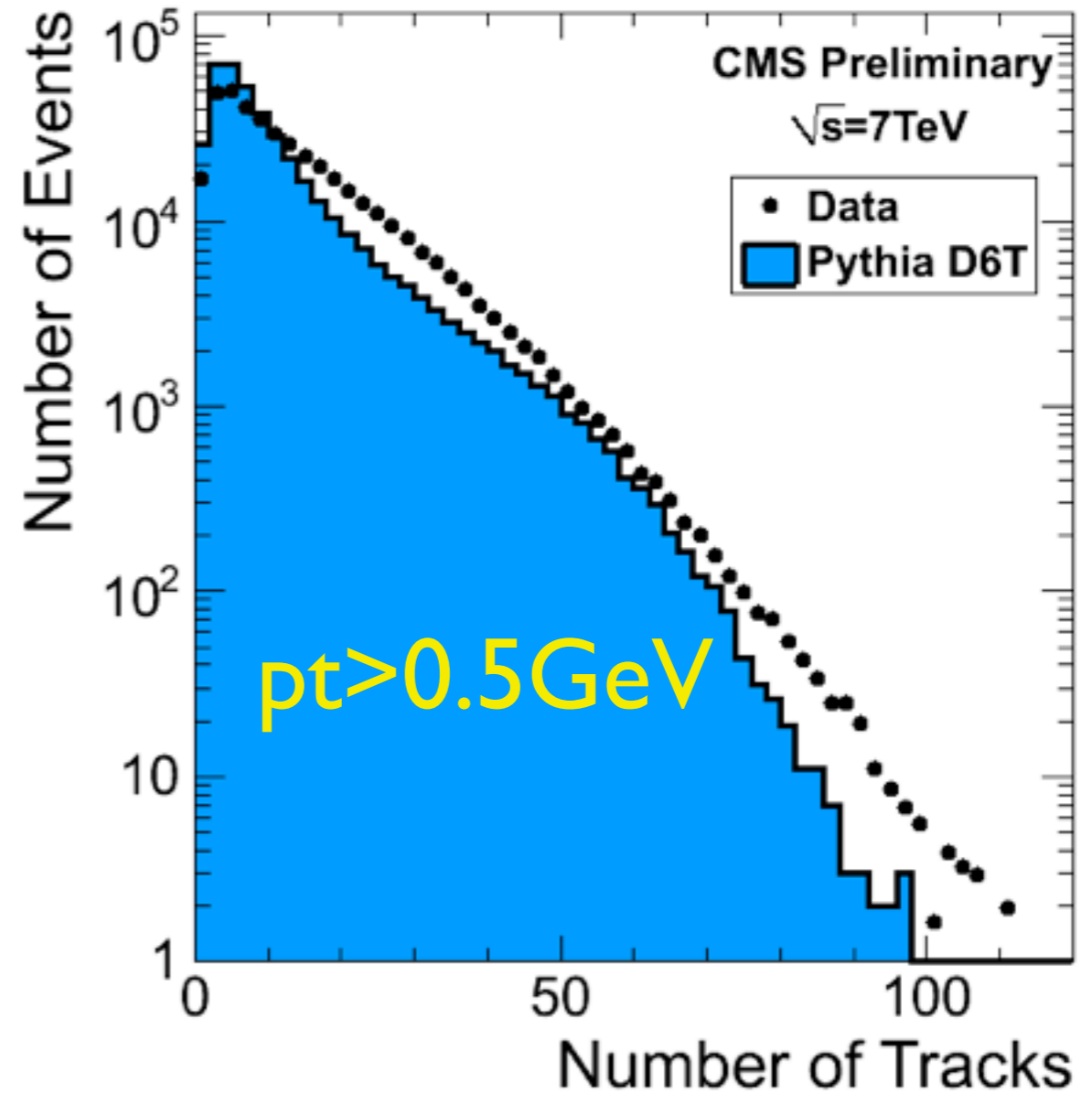
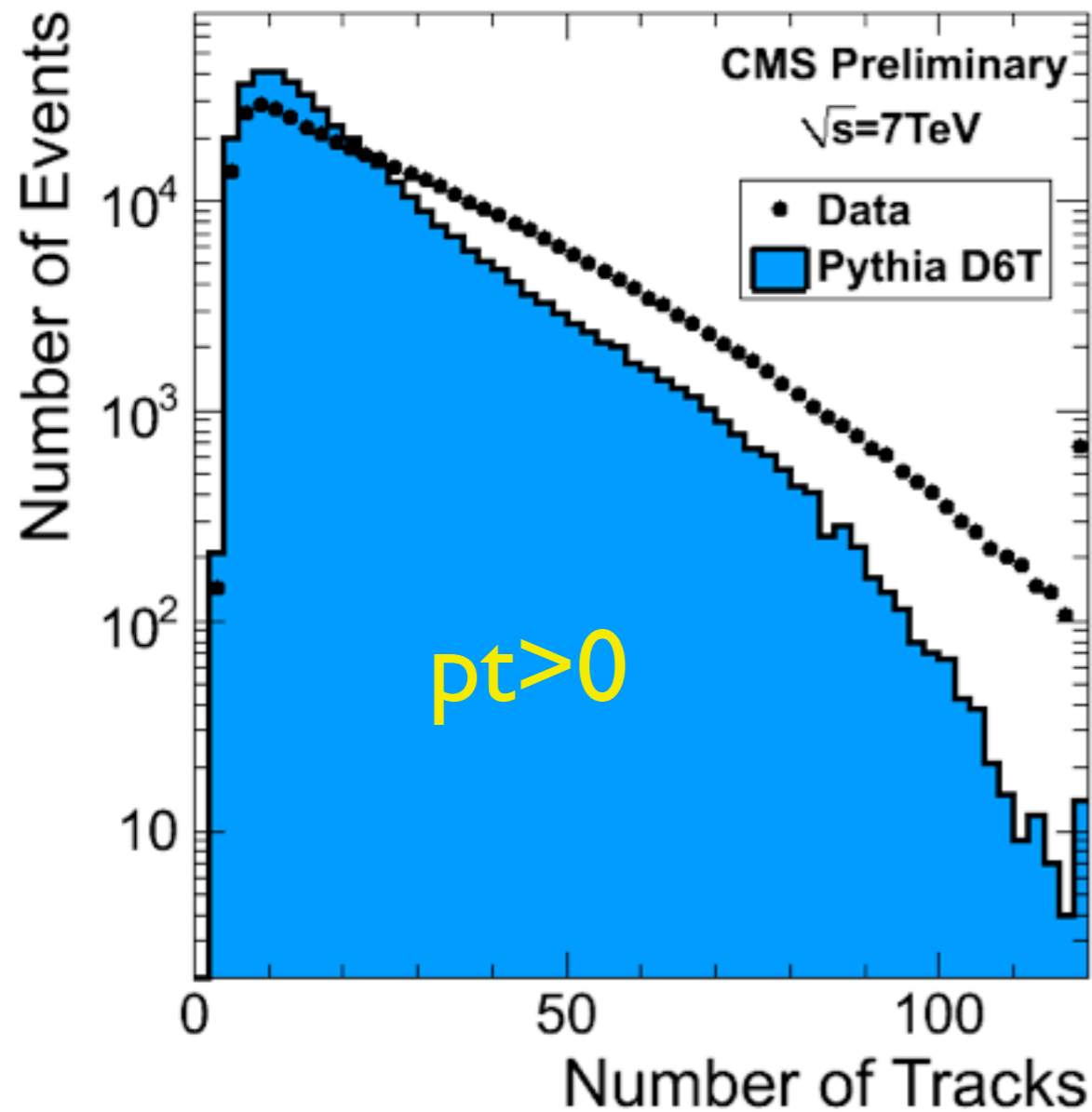
# Data/Pythia 8 Track Distributions ( $p_T > 0.5 \text{ GeV}$ )



- The distributions are normalized by number of Events

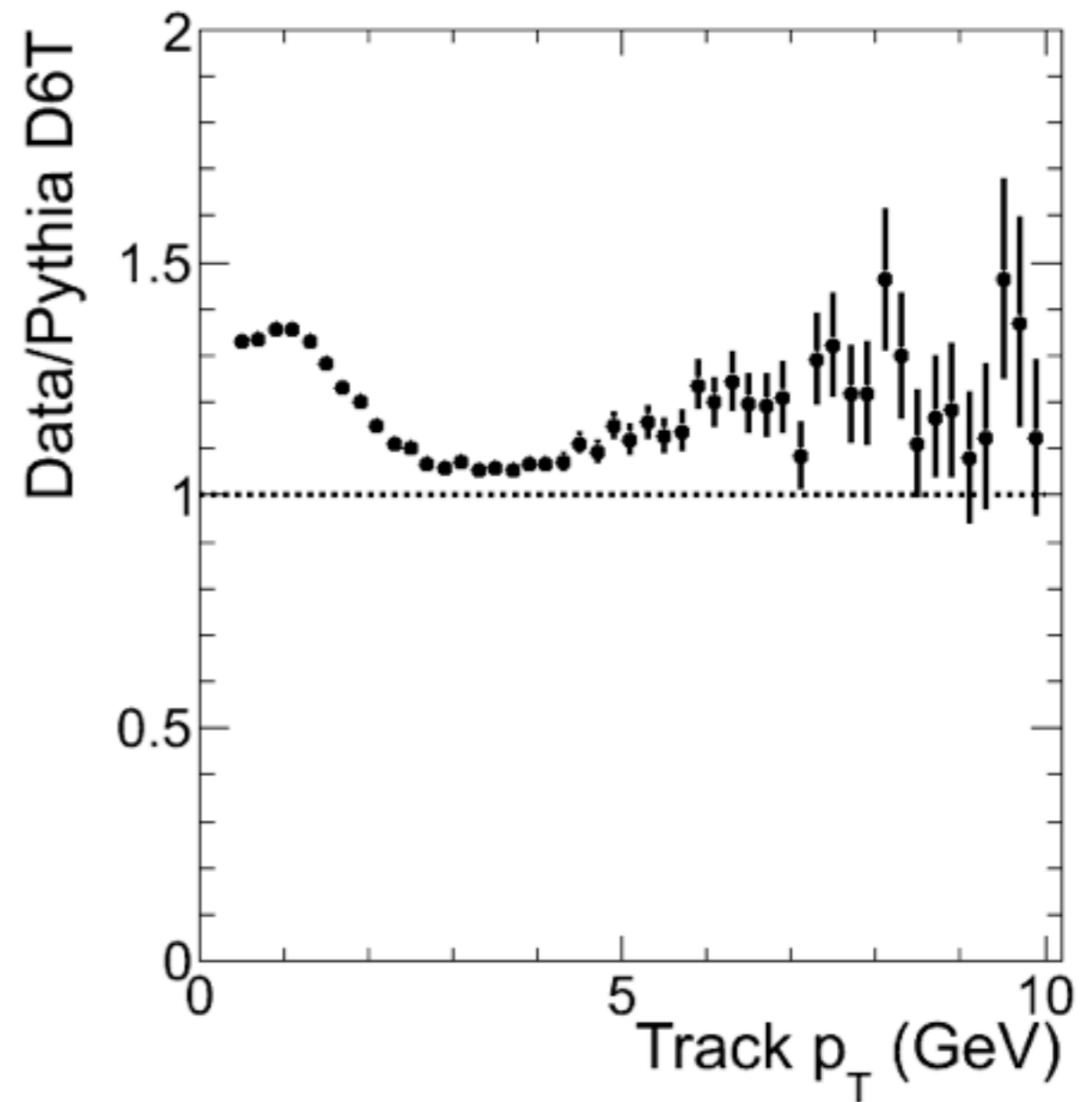
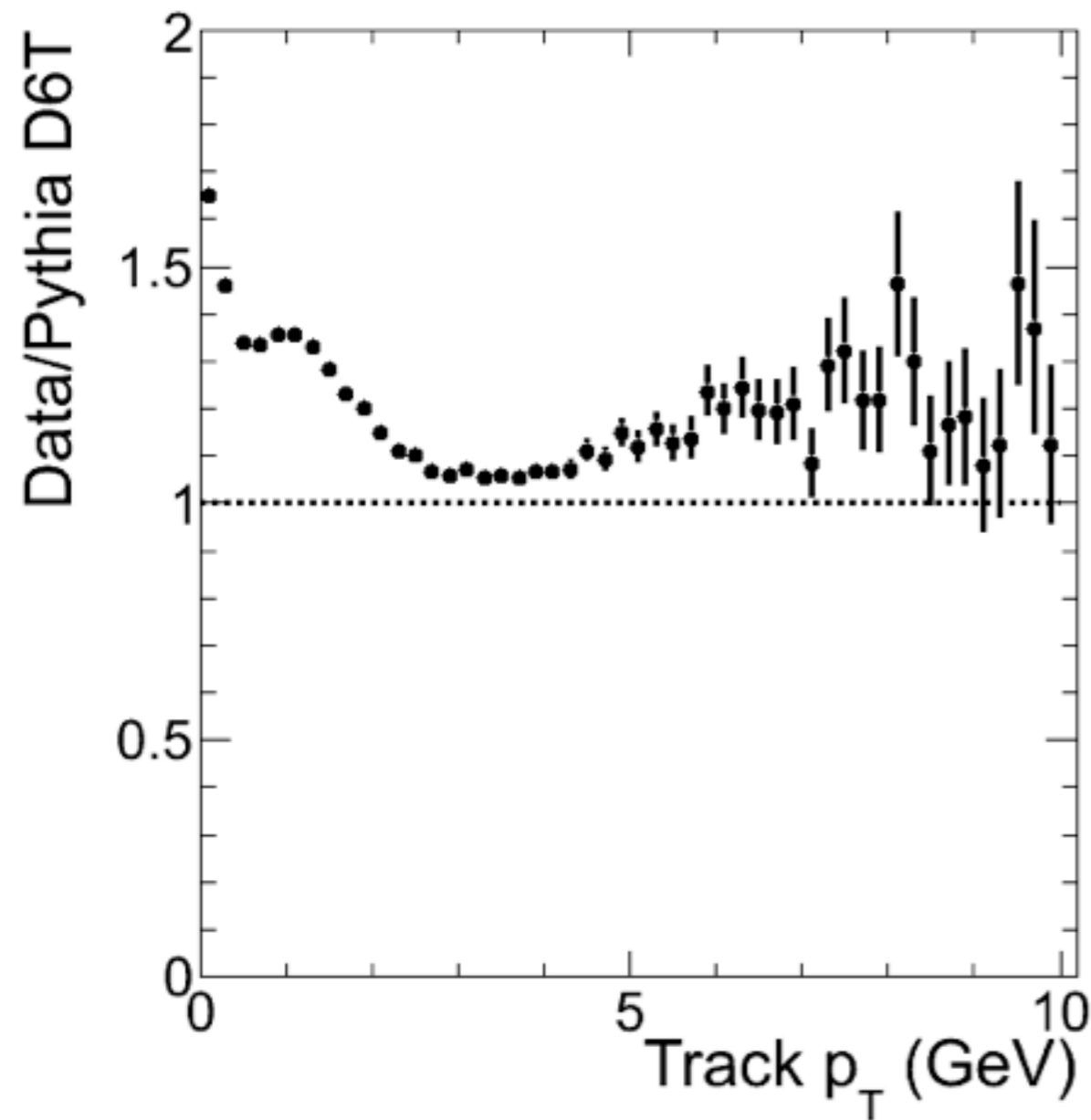
# Data/Pythia D6T

# Data/Pythia D6T nTracks in Log Scale



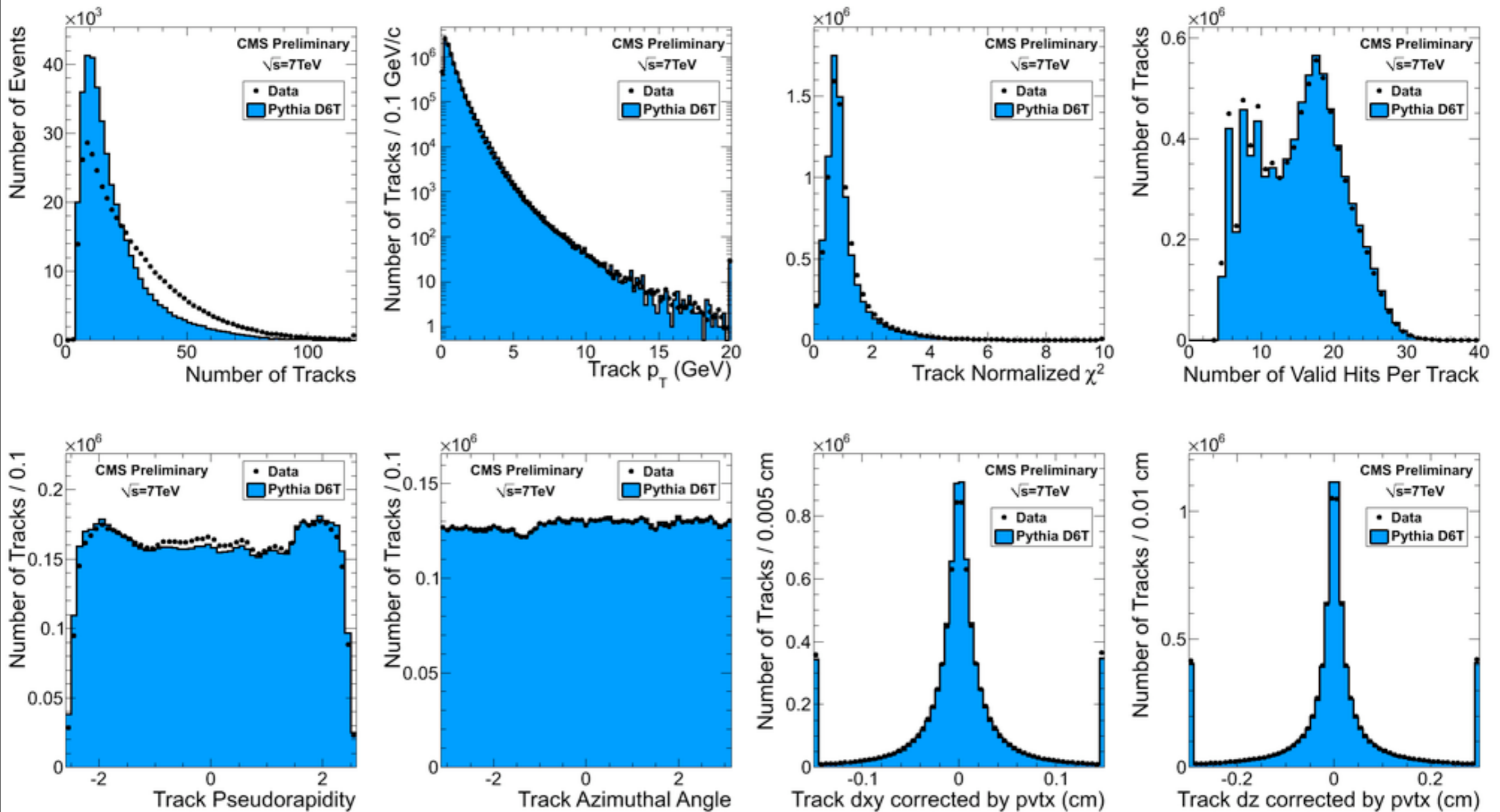
- The excess in the data are mainly in the low  $p_T$  region

# Data/Pythia D6T Data/MC nTrack Ratio vs $p_T$



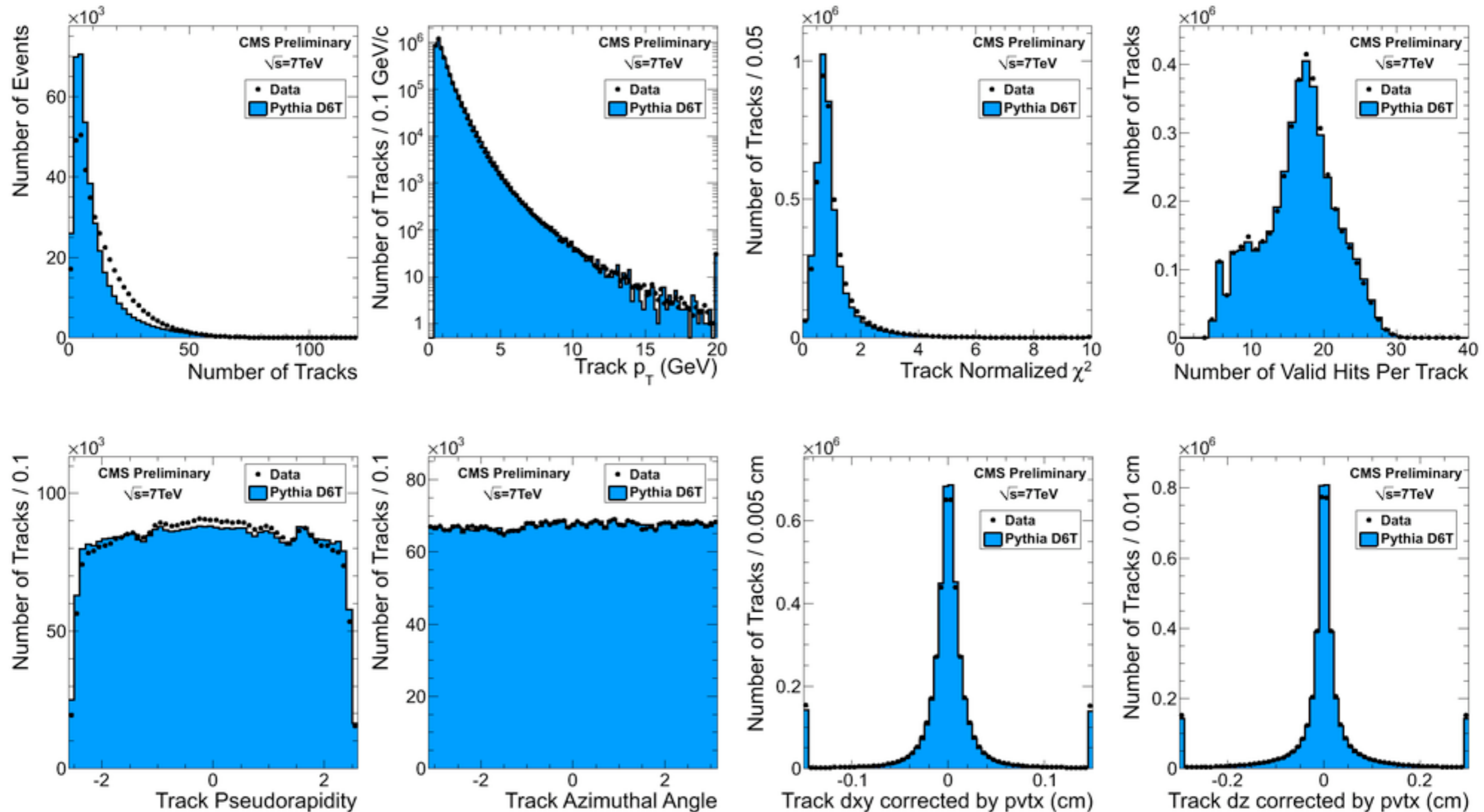
- The data/MC ratio is based on the individual  $p_T$  distributions normalized by number of events

# Data/Pythia D6T Track Distributions ( $p_T > 0$ )



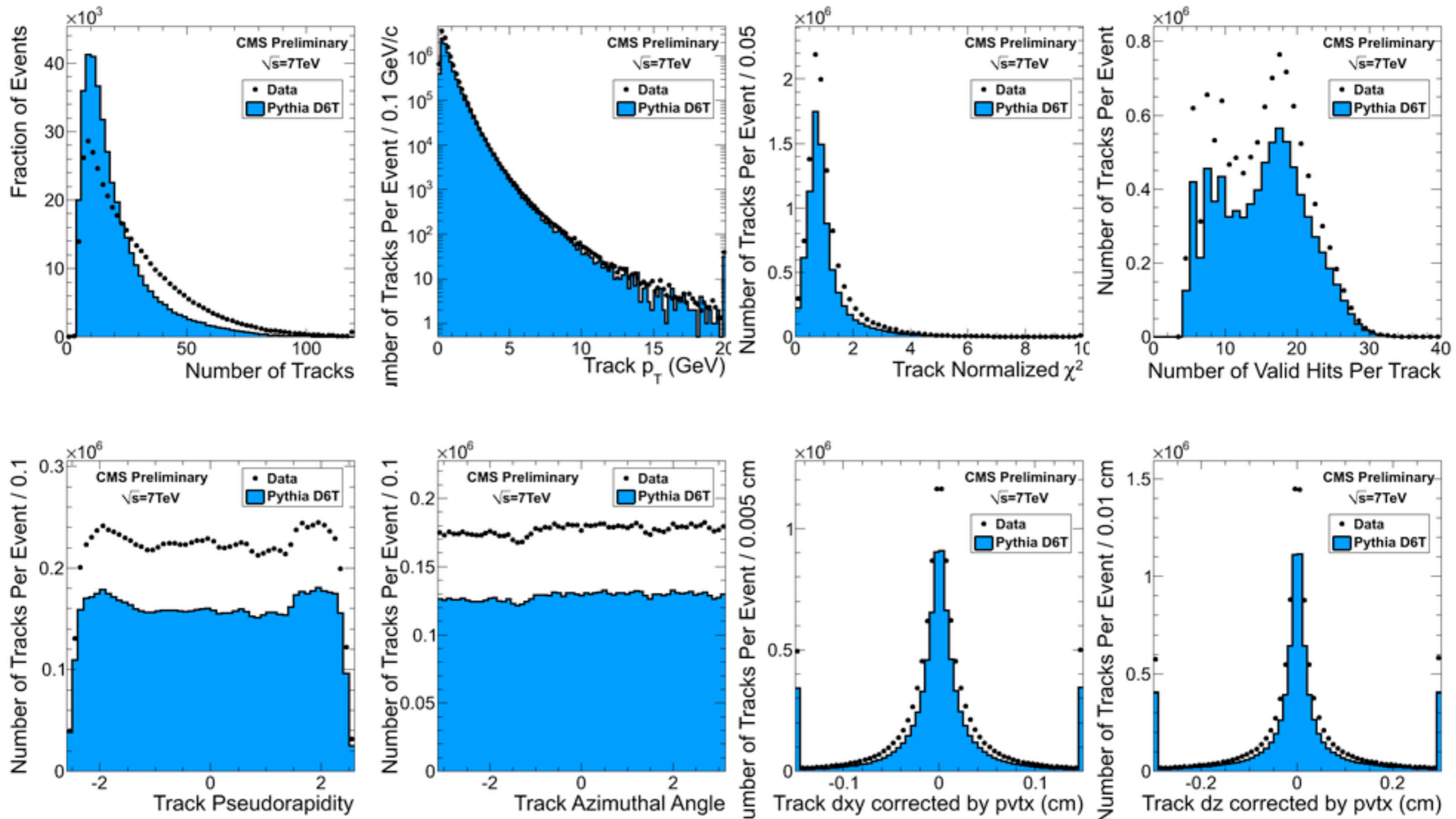
- The track distributions are normalized by number of Tracks

# Data/Pythia D6T Track Distributions ( $p_T > 0.5 \text{ GeV}$ )



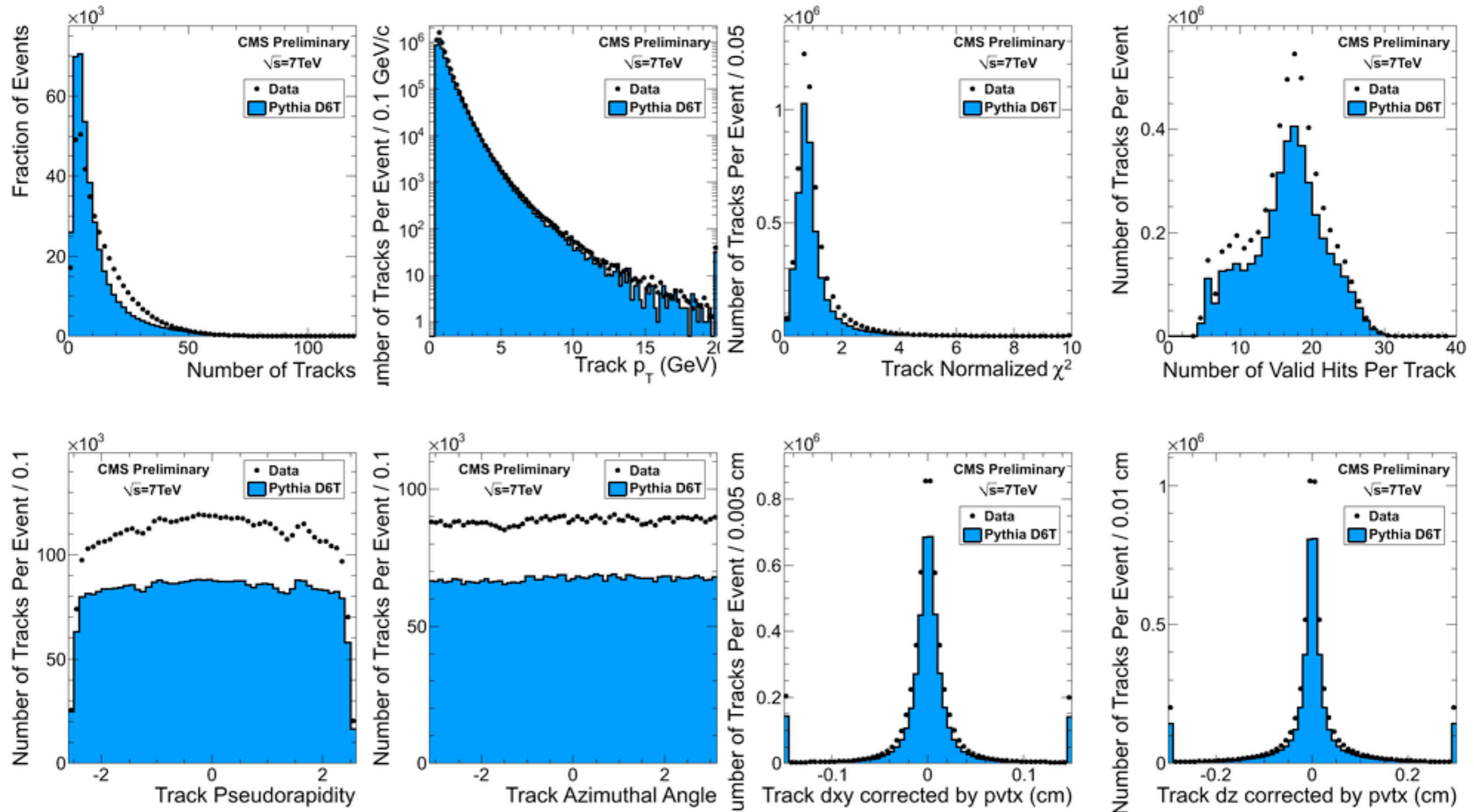
- The track distributions are normalized by number of Tracks

# Data/Pythia D6T Track Distributions ( $p_T > 0$ )



- The track distributions are normalized by number of Events

# Data/Pythia D6T Track Distributions ( $p_T > 0.5 \text{ GeV}$ )



- The track distributions are normalized by number of Events